RAILROAD GAZETTE

FRIDAY, JANUARY 29, 1897.

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Contributions.

The Nicaragua Canal.

JAN. 25, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I have just read with pleasure your editorial on the Nicaragua Canal Bill [Jan. 22]. Since it was written the scheme for relieving the present company of its difficulties has apparently received its quietus. It is now seen that what the company proposed to sell was of little value and the real friends of the canal, of whom there are many, will have opportunity to reflect upon the manner in which they have been buncoed into supporting a private speculation to the delay and injury of the project they have at heart.

Now I should like to see the project thoroughly investigated, both from an engineering and commercial point of view. With all the facts before us, we could arrive at a just conclusion as to the advisability of going into it. The project is of enough importance and commands sufficient interest among the people of the country to justify the expense of this investigation. C. E.

[We are in hearty agreement with C. E. in the wish to see the project thoroughly investigated from an engineering and a commercial point of view. This is what we have been fighting for during the last three years.—EDITOR RAILROAD GAZETTE.]

How Bad Material Gets Into Bridges.

NEW YORK, Jan. 14, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A recent bridge disaster near Gurnee, Ala., recalls to my mind various instances where rolling mills have knowingly sold bad iron and steel by deceiving the inspectors. This it is usually easy to do, as most contractors do not keep an inspector at the mill from the time the material is first rolled till it is accepted. If this is not done an unscrupulous mill operator seldom has material rejected, as the inspector is given samples to test, which he is told are from the same rolling as the material in question, but which are really pieces of known good quality.

Even if the inspector is at the mill all the time it is often possible to deceive him. I know of a case where an inspector had carefully traced his material through the mill in order to be sure that his test piece was taken from the material he was inspecting. The mill knew the rolling was a bad one, and that the material would not stand the required test, and if the inspector got a sample of it it would be rejected. The planer who was to reduce the test piece to the required section, knowing what was expected of him, kept other work in the plane till a little before 12 o'clock, when he put the test piece in, the result being that it was not finished when the men left at noon. The inspector, having marked his piece and noted its position in the plane, went to dinner. As soon as he was gone the planer took out the piece, put another of good quality in its place, planed it and marked it so it was exactly like the former one. The inspector on his return, seeing a piece exactly like the one he had left, never suspected a change had been made. The piece on being tested gave good results and the bad material, which it did not represent, was accepted.

In an another case some iron angles were rolled directly from the puddle ball instead of going through the intermediate process of rolling the puddle ball into muck bar. These angles only showed a unit strength of 20,000 lbs. The inspector of the company for whom they were made got the right test pieces, however, and of course rejected the angles. The manager stated the case to the mill-owner and wanted to know what should be done with this material. The owner said at first it would have to be re rolled, which was of course the only thing to do. But as the manager was going out the owner called him back and said to put the angles in stock. This was done, to work them off at some later time upon a less skillful inspector.

Various methods are sometimes used for making the material look better than it really is. At one mill, where a very skillful blacksmith was employed, it was the custom to have him cut out bad spots in poorly rolled angles and weld in new pieces. It is not necessary to say what kind of a job this makes.

It is sometimes said in defense of the mill that there is practically no danger of accident from using even such poor material as that mentioned above, as the unit strain is usually much less than 20,000 lbs. It must be remembered, however, that in some work the unit stress is allowed to run very high. I recall an instance of a highway bridge recently built out West where the specifications allowed 20,000 lbs. per square inch. It is quite possible that iron or steel which will only stand an ultimate unit strain of 20,000 lbs. will frequently be strained beyond its elastic limit, and if such is the case the member will eventually be ruptured, and structures are designed to stand stresses that may safely be withstood by material of average strength, and if material is used of about one third that strength, although the structure may not fail during the natural life of the material, it is certainly of doubtful safety.

When I read of the failure of bridges and other work where the disaster is not entirely due to faulty design or construction, it seems to me that the cause of failure might be traced to bad material, and that the mill owner who will knowingly sell such stuff is criminally responsible.

REFORMER.

The Brooklyn Elevated Railroads.

NEW YORK, Jan. 20, 1897.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your extracts from and notes on the annual report of the Brooklyn Elevated Railroad [Jan. 15, p. 45] will interest many. Those principally interested in these Brooklyn lines have had a series of disheartening experiences, extending over many years. Neither of the two roads, the Kings County nor the Brooklyn, has ever paid a cent in dividends; the former is now in the hands of a receiver, and the stock of the latter is quoted at about five per cent. of its par value; notwithstanding that both roads have always earned about nine per cent. on the cost of construction; the dilution of securities totally effacing any material benefit to the present holders of the securities.

The Brooklyn report shows an increase in "fixed charges" of about $43,000, and the impression is given that this is mainly due to the construction of the terminal loop at the bridge. Now the increase due to this cause cannot be more than two-thirds of this sum, and a careful reading of the report shows that the increase has been mainly due to other and quite important betterments.

The following results are given for the Brooklyn Elevated Railroad based on the reports of the Railroad Commissioners, for the fiscal years. The "train mile" makes the figures independent of the length of line, which increased greatly from 1891 to 1894. The comparison by passenger and ton-miles also brings into direct comparison the efficiency of train and station service.

Brooklyn Elevated Railroad—1891 *to* 1896, *inclusive.*

Units of Comparison.	1891.	1892.	1893.	1894.	1895.	1896	Ma'h'n 1893.
Oper. exp. per train-mile, cts.	35.7	37.4	38.3	33.3	31.3	31.9	60.9
Oper. exp. per ton-mile, including engines and cars, cts.	0.537	0.55	0.57	0.50	0.52	0.52	0.615
Oper. exp. per passenger-mile, cts.	2.9	2.9	2.9	3.2	2.9	3.1	2.5
Percentage oper. exp. to gross earnings	57.0	56.9	56.8	61.9	55.1	59.9	49.7
Ratio of passengers to train-miles	12.1	12.8	13.3	13.7	11.0	11.0	24.1

It should be borne in mind that the reduction in wages in 1894 amounted to about six (6) per cent. of all operating expenses.

The conditions in Brooklyn are so different from those in New York that it is very doubtful if the elevated roads in the former city can ever pay, purely as urban lines. The advent of the trolley system, which the then managers of the elevated roads were cognizant of before its adoption, has given rapid transit on the surface and the elevated roads can only successfully compete for long distance travel. They must look for this character of travel and the recent connections for Coney Island business is but the entering wedge in this direction.

Electricity must surely follow as a motive power for these roads and no doubt the greater acceleration, the lessening of non productive tonnage and the increase of speed, with diminution of length of trains and cost of handling, with increased frequency of trains, will render this power most satisfactory in its application.

If the Brooklyn roads can secure transit for their trains over the bridge, and terminals in New York City and direct connection with the main lines in New York, not only will some 50,000 persons save three to five days each per year in avoiding transfers, but one of the most serious present obstacles to the development of Brooklyn, the delays and danger of the bridge terminals, will be avoided. There is no logical reason why these lines should not cross the bridge, but to operate an efficient service of this kind will require a far more perfect supervision of trains than anything we have recently seen in connection with these elevated roads.

RAPID TRANSIT.

American Society of Civil Engineers.

We reported last week the result of the election of officers of the American Society of Civil Engineers and the main facts brought forward in the report of the Board of Direction. At the session on Wednesday morning, besides the items of business mentioned above, reports were received from various committees.

The question of the place of the annual convention was not discussed, but the matter was referred to the board with power.

Dr. C. B. Dudley, Chairman of the Sub-Committee of the International Committee on Tests of Steel and Iron, reported that it had been impossible for the committee to get anything ready to submit to the society at its meeting, but he hoped that a report would be made in six weeks or two months. Mr. George M. Bond, Chairman of the Committee on Units of Measurements, hopes to submit a report at the next summer convention.

The matter of the appointment of a committee on the proper manipulation of tests of cements was brought before the Board of Direction as designated by the constitution, and the board presented the following report:

It is quite evident that a committee appointed under this resolution would be concerned only as to the manner and method of making tests, and it would not be required to go into a general consideration of cements or cement specifications. It is a generally admitted fact that although a special committee of the society reported to the society in 1885 certain rules and regulations on this subject, nevertheless the development of the cement industry and the more general use of the material has already caused these rules, although excellent at the time, to be now short of modern requirements. Under these rules it is possible for different experimenters to get widely different results; and such a state of affairs works not only to the detriment and disadvantage of the honest manufacturer but also to the engineer user of the material.

Your board has carefully considered this question and finds the following reasons in favor of appointing such a committee as is proposed by the resolution of the society:

1st. That the methods of tests now known to the world as the standard of the American Society of Civil Engineers, while excellent at the time they were adopted by the society, are not the best possible now, and should be brought to conformity with present knowledge and the latest experience of this country and of Europe.

2d. That a method of making tests should be so devised and specified in detail as to eliminate as far as practical the personal element of the tester in order that the test may more certainly represent the true character of the cement tested. It is a constantly recurring experience with cement manufacturers and users that tests giving unsatisfactory results are, after embarrassing delays and disputes, found to be unfair or incompetent because of some peculiarity in the manipulation. Methods of mixing and making briquettes and conducting the tests which would make these now variable factors uniform in all cases would save a vast amount of time, trouble and expense. If the end desired can be accomplished and the tests of cements like those of metals be made to represent uniformly and truly the strength of the cement tested, defects and virtues shown by tests will in every case be due to qualities dependent upon chemical constitution, methods of manufacture or treatment, and improvement in these latter would be more easy to discover and make.

The reasons in opposition to the appointment of such a committee appear to be:

1st. That it is inadvisable for the society to adopt standards of any kind; that such work is better done when left to individuals.

2d. That in the case in question it is doubtful whether it is possible to adopt any methods of preparing and testing briquettes whereby the personal equation can be reduced to a negligable quantity.

Your board, however, is of the firm opinion that the reasons in favor of appointing the committee outweigh those in opposition, especially in view of the fact that a committee of the society has already promulgated rules in this matter, which, for the reputation of the society should be kept at the highest attainable standard or else revoked.

It seems probable from what has been already said and written concerning the appointment of the proposed committee that an effort may be made to reopen the entire subject of cement tests as considered by the former committee of the society, and not confine the work to the simple matter of proper manipulation of tests. Your board has given some attention to this matter and is strongly of the opinion that the duties of the proposed committee should not be changed from those outlined in the resolution. Many and continuous efforts are being made in Europe by cement manufacturers and others, by concerted as well as individual action, to arrive at some uniform requirements which shall become the standard specifications for cements, but as yet no uniform specification has been decided upon, and the problem is probably a more difficult one in this country than it is in Europe. It does not seem at the present time to be advisable to have a rigid set of specifications for cements in this country, where the character of the different products manufactured will necessarily vary with the materials available for use in the different regions, and where the whole process of manufacture is in a course of development which would apparently be rather dwarfed and confined than benefited by a set of specifications put forward by the American Society of Civil Engineers, to apply to the whole country.

The society voted to submit the recommendation of the board to letter ballot according to the provisions of the constitution.

In the evening of Wednesday a reception was held at the Waldorf.

On Thursday many members of the society made a visit to the works of the new Croton dam at the invitation of Mr. A. Fteley, Chief Engineer of the Croton Aqueduct Commission. A special train from the Grand Central Station took the party to Croton, whence it was driven to the site of the dam in carriages. More than an hour was spent in looking over this work. The system of cableways by which the material is handled received much attention. Three wire cables, 2 in. in diameter, are stretched across the valley at a height of about 175 ft. above the river. The cables are 1,400 ft. from anchorage to anchorage.

Much interest was also taken in the method of excavation. The material is a decomposed limestone, too soft to drill and too hard to shovel. A combination method is therefore employed. A small tunnel about 3 ft. square is run horizontally into the bank for about 30 ft. and from the end of this two lateral drifts are pushed out. In these, after refilling the original tunnel, are exploded from 30 to 50 25-lb. charges of powder and the loosened rock is then taken up by a steam shovel and transferred to cars which are drawn by a cable up an incline to the top of the dumps.

The manner of laying the masonry was highly praised. The rock used is a hard gneiss, containing considerable iron and is quarried at a point about 2 miles above the dam. Each stone is steamed and washed carefully before being put in place and no work is done when the thermometer is lower than 20 deg.

After this inspection a luncheon was served and on the return trip the special train passed over the new Harlem River drawbridge and viaduct in Park avenue This was the first train over this line, which will not be regularly opened until about the middle of February. A stop was made for the inspection of the new bridge.

Erie Track Elevation in Jersey City.

The Erie Railroad Company must elevate its tracks in Jersey City and do away with the crossings of streets at grade. In this the Jersey City authorities and the company are agreed, although there are, it now appears, certain differences as to the detail of the work proposed.

Historically, the present situation simply is that, after many conferences between representatives of the city and officers of the company, the latter have submitted plans, and a written contract embodying the company's understanding of all that was agreed upon in verbal conference. But the presented plans and contract are, it is said, unsatisfactory in some respects to the Jersey City authorities, who now propose the appointment of one or two engineers to represent the city's interest, by showing how the plans may be changed to do away with features held to be objectionable.

This method of settling differences is likely to cause delay in starting the work. But to this the company will hardly object, being by no means impatient to begin. It is the city that will be benefited by the elevation of the tracks. The company has nothing to gain —will, indeed, lose—in this respect that, after the elevation, the grade lines, as the profile shows, will be more unfavorable than now. The company's share in the enterprise, is, therefore, to undertake a costly work of construction, with no saving in cost of operation. But grade crossings in Jersey City must be abolished. The Pennsylvania Railroad tracks have been lifted out of the streets and now it is the Erie's turn.

In the plan proposed, there are six streets (Henderson, Grove, Erie, Jersey avenue, Coles and Monmouth) over which the railroad will be carried on bridges. The crossings are nearly rectangular. Through bridges steel girders) will be used, with tight floors of steel plates. The streets are 60 ft. wide, except Jersey avenue, which is 80 ft. wide. There will be posts near the curb lines to support the girders, thus dividing the bridge over each street into three spans—one over each sidewalk, and the middle span over the roadway. Seven or more tracks will be carried over each street. The masonry abutments will stand on the company's property, flush with the street lines and connecting the abutment on the south side of one of the streets and the abutment on the north side of the next street, will be two retaining walls, 100 ft. or more apart, also on the company's property. The rectangular space included between these abutments and walls, and similarly in the other blocks, will be filled up to the elevation of the proposed new grade with stone, earth, ashes or other suitable material. The yard plan, Fig. 1, and the profile, Fig. 2, show where it is intended to build the walls and how the grade is to be raised by filling between them. Where no walls are shown on the line of the elevation, the method of construction will be an embankment with natural slopes.

The elevation of the Erie tracks will not, perhaps, be without effect on the general arrangement of the whole contiguous yard. As is seen from the plan, Fig. 1, of the Erie terminal in Jersey City, the passenger tracks divide the yard into two parts, with the effect that the main line must be frequently crossed in the movement of cars to and from the grain elevator and the several docks and wharves. Moreover, Henderson street, the point where the yard tracks converge to a "neck," is so near to the wide part of the yard that the drilling engines, in moving the freight and the passenger cars, run up into the narrow part, toward Grove street and beyond, where there is not then room for all to move without interference with each other; and where the complication is further increased by the passenger engines which, also running into this narrow neck, there cross the main line in moving between "farm" and "dock," and in going for coal.

When such of the tracks are elevated as are included between the wall lines shown in Fig. 1, all those track systems closely articulated with the main line must be rearranged. In this rearrangement, the aim of the plans now in course of preparation is to lessen the cross ing-over by putting the coal pockets, the turn-table, the water column, the "farm" and the locomotive shops all on one side of the main line; and to do away, as far as possible, with interferences between the drilling engines by increasing the number and length of the track leads.

In connection with the elevation of the tracks, the company has shown some intention, or earnest of intention, to relieve the congestion at its Bergen tunnel, by, in some manner, separating the freight and the passenger traffic, and providing additional tracks. But it is not altogether easy to say what should be done.

The limiting conditions are such as these: Near the east portal of the tunnel, the New Jersey Junction Railroad crosses over the Erie road, with a clearance of some 18 ft. Just beyond the other end of the tunnel, the Delaware, Lackawanna & Western Railroad crosses over the Erie similarly. In any plan, therefore, to provide the Erie Railroad with two additional tracks through Bergen Hill, the elevation of the grade line must either be the same as that of the present tracks, or else high enough to pass over the New Jersey Junction and the Delaware, Lackawanna & Western. There seems to be no middle course.

Two plans for cutting through Bergen Hill have been prepared—one a thorough cut, the other a high grade line, see sections, Fig. 3. A plan of the lines is shown in Fig. 4. from which it is seen that the refusal of the Jersey City authorities to permit a slight change in the direction of Hoboken avenue, has compelled the company to make use of a tunnel, although a tunnel is exactly what the company is trying to avoid.

It has been objected to the thorough cut plan, that no contractor has been found willing to undertake the obligation to complete that great cut, involving the removal of 1,000,000 cu. yds., almost entirely trap rock, in less than six years; and further that the plan does not absolutely separate the freight and the passenger traffic, it being necessary, under this plan, for the passenger trains on one of the branch roads to cross the main freight tracks at grade. not far from the west end of the tunnel, and, near the same point, for the freight trains of another branch to make a grade crossing of the main passenger tracks.

The super-elevated line, approaching the hill from the eastward, on an embankment and steel viaduct, with a grade of 44 ft. to the mile, and similarly from the westward with a 30-ft. grade, and with an excavation averaging some 40 ft. deep through the hill, can, the company's engineers believe, be completed in two years of active work. This line is entirely separated from the freight service. In either event, the cut through the Bergen Hill will be made by a separate company formed for that purpose, which will be known as the Penhorn Creek Railroad.

Each of the two plans is estimated to cost $1,200,000. The cheapest plan of all, if a new tunnel would be tolerable, would be to drive a new one.

From the foregoing outline of the plan for elevating the tracks, rearranging the yard and relieving an over-

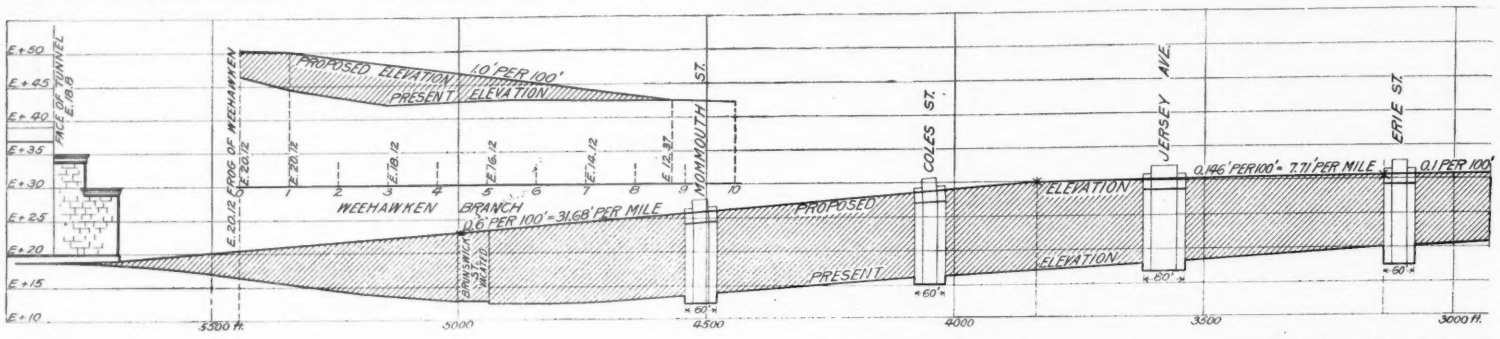


Fig. 2.—Profile Showing Present and Proposed Elevation of the Erie Railroad's

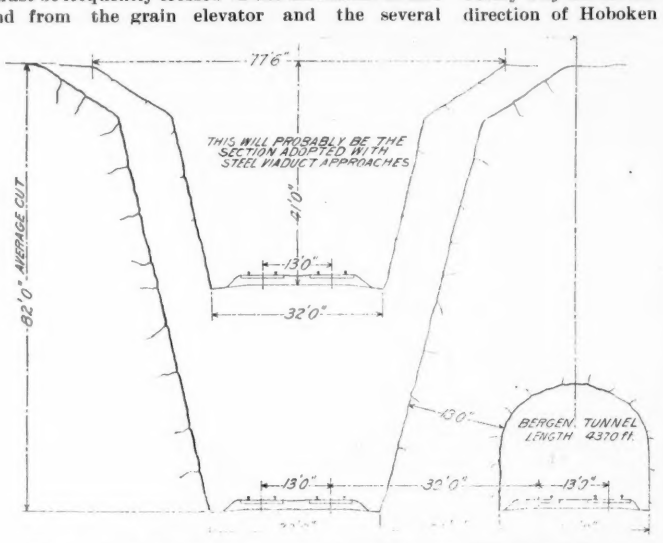


Fig. 3.—Possible Sections of Cuts through Bergen Hill, Erie Railroad.

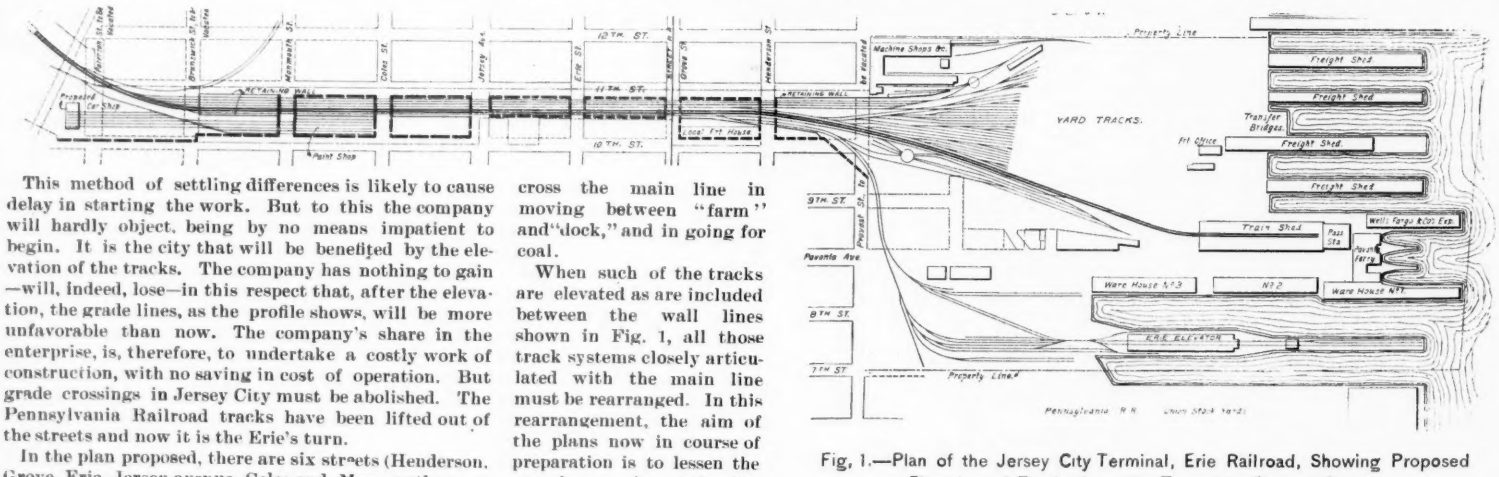


Fig. 1.—Plan of the Jersey City Terminal, Erie Railroad, Showing Proposed Elevation of Tracks from the Tunnel to Provost Street.

Owing to the reduction necessary in this plan, and to the radical rearrangement of the yard tracks which is proposed, they have been omitted. There are eight tracks in the train-shed, but only two of these are shown. The heavy broken lines indicate the positions of the retaining walls and abutments.

taxed tunnel, it is seen that the work of improving the Erie's terminal in Jersey City is a task of no small magnitude.

Train Accidents in the United States in December.

COLLISIONS.

REAR.

2d, on Central of Georgia, near Hamilton, Ga., collision between a passenger train and a freight, in which the engineman was killed and several passengers were injured.

3d, on Buffalo, Rochester & Pittsburgh, at Le Roy, N. Y., a passenger train ran into the rear of a preceding freight, wrecking the caboose and damaging the engine. Three passengers were injured. A flagman was sent back from the freight, but he did not go far enough.

3d, on Union Pacific, at Kimball, Wyo., an eastbound passenger train ran into a freight which had been delayed in entering a side track, and the caboose and 3 cars were wrecked. The engineman jumped off and was injured.

15th, on Chicago, Milwaukee & St. Paul, near Lake City, Minn., a freight train broke in two and the rear portion afterward ran into the forward one, wrecking 8 loaded cars. A tramp was killed.

17th, on Lehigh Valley, at Buffalo, N. Y., a passenger train ran into the rear of a preceding passenger train which had been unexpectedly stopped, wrecking one car. One passenger and 3 trainmen were injured. There was a dense fog at the time.

22d, on Chicago & Northwestern, at Ontario, Ia., a freight train ran over a misplaced switch and into some freight cars standing on a side track, making a bad wreck; engineman and fireman killed.

28th, on Western & Atlantic, near Dalton, Ga., a freight train ran into the rear of a preceding freight which had been unexpectedly stopped by the breakage of a coupling; caboose and 2 cars wrecked; engineman injured by jumping off.

And 6 others on 5 roads, involving 8 freight trains.

BUTTING.

6th, on Southern Pacific, near Waelder, Tex., butting collision of freight trains, making a bad wreck. Both enginemen, both firemen and one brakeman were killed. It is said that the men on the eastbound train, while waiting on a side track, went to sleep, and on waking assumed that the westbound freight had passed, when, in fact, it had not. There was a dense fog at the time of the collision.

7th, on Baltimore & Ohio Southwestern, at Sedamsville, O., butting collision between an officers' train, westbound, and a regular passenger train, eastbound, making a bad wreck. Both firemen and one other employee were killed and 3 passengers and 4 employees were injured. The conductor and engineman of the special forgot about the regular train.

18th, on Pennsylvania road, at Driftwood, Pa., butting collision of freight trains, wrecking both engines and 8 cars. A brakeman was killed and a tramp injured.

18th, on Southern Pacific, near Benson, Ariz., butting collission of freight trains, wrecking 3 engines and several freight cars. A man riding on one of the trains was thrown off and fatally injured,

29th, on Western & Atlantic, near Acworth, Ga., butting collision of freight trains, making a bad wreck. The conductor of one of the trains received an order annulling train No. 9 of Dec. 28, and carelessly assumed that it referred to train No. 9 of Dec. 29, and in consequence ran past the regular meeting place. One brakeman was killed by jumping off.

And 2 others involving 4 freight trains.

CROSSINGS AND MISCELLANEOUS.

11th, on Central of Georgia, at East Point, Ga., collison of switching freight trains; fireman injured.

18th, 8:30 a. m., at Delphi, Ind., collision of trains of the Wabash and the Louisville, New Albany & Chicago at the crossing of two roads.

27th, on Southern Railway, near Gurnee, Ala., collision between a relief train and a work train near the Cahaba River bridge, at which a disaster had occurred in the same day; a carpenter was killed and another employee was injured.

And 6 others on 5 roads, involving 1 passenger train and 8 freight and other trains.

DERAILMENTS.

DEFECTS OF ROAD.

1st, on Pittsburgh, Shenango & Lake Erie, at Springboro, Pa., a freight train was derailed by a broken rail, and the engine and 18 cars were ditched. The engineman and 1 brakeman were injured.

21st, on Grand Trunk, near Danville Junction, Me., a passenger train was derailed by a broken rail and 3 cars were badly damaged. Ten passengers were injured.

And 2 others involving 2 freight trains.

DEFECTS OF EQUIPMENT.

4th, on New London Northern, near Mansfield, Conn., the engine of a freight train was wrecked by the explosion of its boiler, and 3 trainmen were killed. Most of the cars were derailed and 16 of them were wrecked.

8th, on West Virginia, Central & Pittsburg, near Cumberland, Md., a freight train was derailed by a broken wheel, and 20 cars were wrecked; engineman and fireman injured.

12th, on Pennsylvania road, at Collins, Pa., a freight train was derailed by a broken axle, and 5 cars were wrecked. One brakeman was killed.

16th, on Southern Pacific, near Auburn, Cal., a freight train descending a steep grade broke in two a few cars back of the engine, and the conductor and one brakeman, standing on top of the forward end of the foremost car of the rear portion of the train, were thrown off, the speed of the cars being checked very suddenly by the automatic application of the air brakes. The conductor's body was thrown upon the rail and derailed one car. The brakeman fell down a bank and was badly injured.

23d, on Pittsburgh, Cincinnati, Chicago & St. Louis, near Hanlin's, Pa., a freight train was derailed by a broken axle and 12 cars were wrecked. Two trainmen were injured.

29th, on Central of Georgia, near Louisville, Ala., a passenger train was derailed by the breaking of an axle of the front truck of the engine; the engineman was killed and the fireman injured.

And 7 others on seven roads, involving 7 freight trains.

NEGLIGENCE IN OPERATING.

2d, on Pennsylvania road, near Burmont, Pa., a passenger train was derailed at a point where a rail had been taken out for repairs. The engine ran over the break in the track and ran upon the rails at the other side, but the tender and express car fell part way down a bank and the rest of the train came very near going over. The mail car caught fire from the stove and some letters were destroyed. It appears that this train is due at Burmont at 12:14 p. m.; the repairmen were at dinner at this time, and on resuming work at one o'clock assumed that the passenger train had passed, when in fact it was about one hour late.

22d, on New York Central & Hudson River, at 135th St., New York City, an engine running backward was derailed as it entered upon the lift bridge over the Harlem River, the rails having been misadjusted when the bridge was last closed.

And 5 others on 4 roads, involving 1 passenger train and 4 freight trains.

UNFORESEEN OBSTRUCTIONS.

4th, on Atchison, Topeka & Santa Fe, at Justin, Tex., a freight train was derailed at a misplaced switch, and the engine and 5 cars were ditched, The fireman and one brakeman were killed and the engineer fatally injured. It is believed that the switch was maliciously misplaced.

5th, 3 a. m., on Northern Central, near Pembryn, Pa., a passenger train was derailed, the engine and all of the eight cars running about 1,000 ft. after leaving the rails. The baggageman and 2 postal clerks were injured. It is said that the track had been maliciously obstructed.

13th, on Northern Pacific, near Forsyth, Mont., a freight train was derailed by a rock which had fallen upon the track and the engine and 6 cars fell into the Yellowstone River. The engineman, fireman and one brakeman were injured.

13th, on the Rio Grande Junction near Cameo, Col., a passenger train of the Colorado Midland was derailed by a rock which had fallen upon the track. The train soon after took fire from the explosion of the heater in the sleeping-car and the three cars were burned up. All the passengers and trainmen escaped with slight injuries.

16th, on New York & Long Branch, at Elberon, N. J., a passenger train was derailed by snow.

18th, on Baltimore & Ohio Southwestern, at Hamden, O., passenger train No. 2 was derailed in consequence of striking a cow, the body of the cow being thrown against a switchstand with such violence as to move the rails and turn a part of the train upon a sidetrack. The engine was overturned, wrecking a freight car standing near by. The postal car was badly damaged. One postal clerk was killed and 2 others injured, one fatally; and the conductor and fireman were injured.

22d, on Southern Railway at McComb's, near Birmingham, Ala., a passenger train was derailed at a point where the spikes had been maliciously loosened, and ran a considerable distance on the sleepers, finally stopping with the front end of the engine on a high trestle.

22d, on Erie road, near Rutherford, N. J., a brakebeam of a platform car loaded with lumber broke loose and fell upon the track. The obstruction did not derail the car, but jolted it so violently that some of the heavy timbers with which the car was loaded fell off upon the adjoining main track immediately in front of a westbound passenger train. The passenger engine was derailed and fell into the ditch. The passenger cars were all scratched and some of them badly damaged by timbers projecting from the load in the freight train. The engineman and fireman of the passenger train were killed and one passenger was injured.

24th, on Louisville & Nashville, near Lebanon Junction, Ky., the engine of a passenger train was derailed by a rock which had fallen upon the track. The engineman jumped off and was injured.

27th, 7 a. m., on Southern Railway, near Gurnee, Ala., a passenger train consisting of an engine and 3 cars was derailed on a bridge 110 ft. high and fell to the shallow stream below, the cars being completely crushed. Flames immediately broke out from the stoves in the cars, and that part of the wreck above water was soon burned up. Of the 29 passengers and 5 trainmen on the train only 13 survived. Seventeen passengers were killed by the fall or were burned to death and 7 were injured. All of the 5 trainmen were killed except the fireman, who jumped into the river and escaped with a broken arm. The derailment was due to the malicious displacement of a rail.

30th, on International & Great Northern, near Austin, Tex., a freight train was derailed by a misplaced switch and several cars were overturned in the ditch. A brakeman was killed and the engineman was injured. It is believed that the switch was maliciously misplaced.

30th, 1 a. m., on Seaboard Air Line, near Raleigh, N. C., a freight train was derailed and the engine and 10 cars fell down a high bank. The fireman was burned to death and the engineman was injured. It is said that a rail had been maliciously loosened.

UNEXPLAINED.

4th, on Nashville & Knoxville, near Cookeville, Tenn., a passenger train was derailed, and the engineman and fireman were injured.

5th, on Chicago & Northwestern, at Kinnikinic, Wis., 8 cars of a freight train were derailed, and a man stealing a ride was killed.

11th, on Altoona, Clearfield & Northern, near Altoona, Pa., a passenger train was derailed and a passenger car fell down the mountain side 50 ft. One trainman was injured. The car took fire and was burned up.

16th, on Pennsylvania road, at Pickering, Pa., a freight train was derailed and the engine and 3 cars fell down a high bank. The fireman and 2 other men were injured.

18th, 10 a. m., on Louisville, New Albany & Chicago near Guernsey, Ind., a car in a wrecking train, running at high speed, was derailed and ditched. One employee was killed and 3 others injured.

18th, on Illinois Central, near Chatawa, Miss., a car in a freight train was derailed and overturned; 2 brakemen injured.

20th, on Texas & Pacific, near Sodus, La., a freight train was derailed, killing 3 men and injuring 7.

24th, on Wheeling & Lake Erie, near Warrenton, O., an empty engine was derailed on a sharp curve and fell down a bank. The engineman was killed and the fireman badly injured.

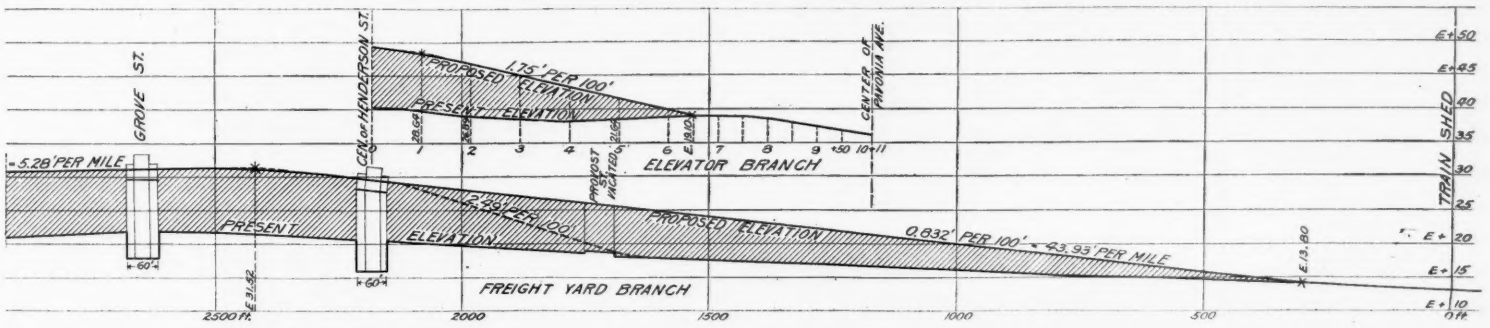
30th, 10 p. m., on Baltimore & Ohio, at Pittsburgh, Pa., a car in a freight train was derailed while crossing a street railroad track, and with several other cars fell off a trestle. Several cars beneath the trestle were struck by the falling cars and wrecked. One brakeman was killed and another injured. Three trainmen beneath the trestle narrowly escaped.

And 15 others on 14 roads, involving 3 passenger and 12 freight and other trains.

OTHER ACCIDENTS.

9th, on Philadelphia & Reading, near Lafayette, Pa., the engine of a gravel train was badly damaged by a wire cable hanging across the track, which had accidentally sagged; 2 employees were injured.

10th, 4 a. m., on Illinois Central, at Trimble, Tenn., the combination baggage, express and mail car of an express train was badly damaged by fire, a large quantity



Tracks in Jersey City. Datum is That Given by the City Engineer of Jersey City.

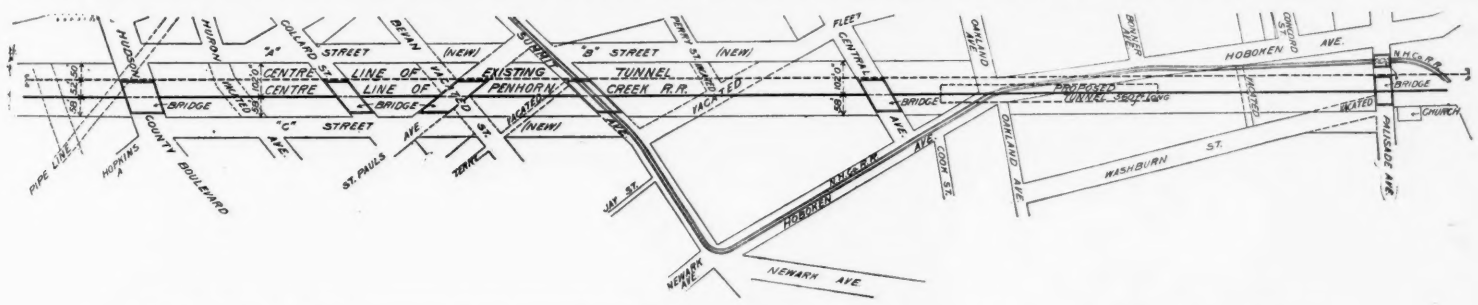


Fig. 4.—Plan Showing the Location of the Proposed Cut through Bergen Hill and the Necessary Arrangement of Streets—Erie Railroad.

of baggage and mail being burned up. It is thought that the fire was started by the explosion of an oil lamp.

19th, on St. Louis, Iron Mountain & Southern, at Gads Hill, Mo., the locomotive of a freight train was wrecked by the explosion of its boiler; engineman and one brakeman killed and another brakeman injured.

28th, on Baltimore & Ohio, near Clarksburg, W. Va., the locomotive of a freight train was wrecked by the explosion of its boiler. The fireman was injured.

And 2 others, involving 2 passenger trains.

A summary will be found in another column.

A Detector for Closed Air-Brake Cocks.

One of the standing sources of train accidents is the failure to open the angle cock at the back of the tender when the engine is coupled to the train. To provide against this contingency Mr. A. L. Wheeler, an engineer on the Illinois Central, has invented and patented a device which has been applied to 20 engines on the Illinois Central, is in trial on one engine of the North Western and one of the Chicago, Milwaukee & St. Paul, and which is now being applied to an engine on the Rock Island. Mr. William Renshaw, Superintendent of Machinery of ithe Illinois Central, has sent us blueprints and a description of this device, from which we have reproduced the engravings herewith and give the description nearly verbatim.

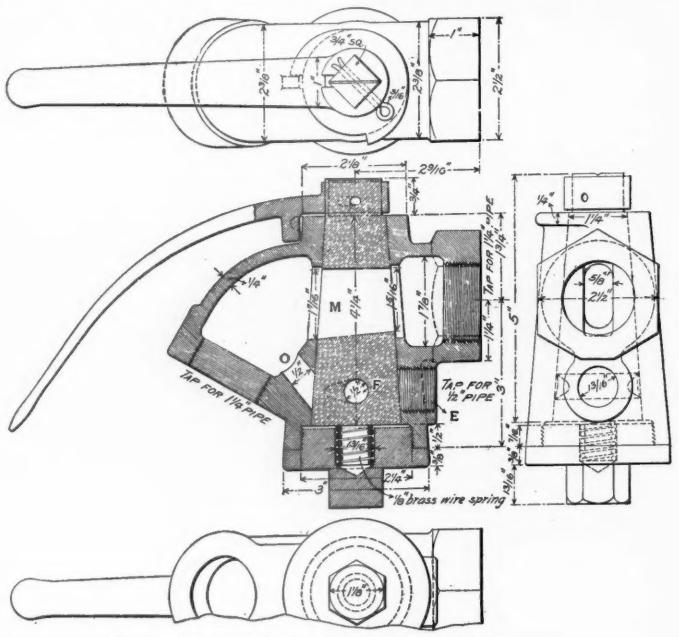


Fig. 1.—Modified Angle Cock for Wheeler's Detector.

At the rear of the tender is used a Westinghouse angle cock, somewhat modified; that is, the body and the plug are extended below to give room for the opening *O* in the body and for tapping in a half-inch auxiliary pipe at *E*, and for drilling a port *F* through the plug, as shown in Fig. 1. On the boiler is placed the signal cock *B*, Fig. 2, which is located near the engineer's valve and within convenient reach of the engineman. To this is attached a whistle, *G*. This cock and whistle are shown in detail in Fig. 3. A port, *H*, through one side of the plug of the signal cock, connects the auxiliary pipe and the whistle, according to the position of the handle of the cock. A half-inch pipe, shown in Fig. 2, connects at *K* to the 1-in. train pipe, which runs to the front of the pilot, and this half-inch pipe leads up to the signal cock and from the other end of the signal cock a similar pipe goes down under the deck plate and is connected by a hose connection to the auxiliary pipe, which runs back under the tender to connect with the angle cock at *E*.

When the angle cock is in the position shown in Fig. 1, the main port *M* is open and the engineman has full command of the train brakes. In this position the handle of the signal cock stands horizontal, as in Fig. 2, and the ⅛-in. auxiliary pipe is in connection through ports *H* and *J* (Fig. 3) with the whistle. If the angle cock is closed, shutting off connection with the train pipe, the port *F* (Fig. 2) in that cock comes into connection with opening *O*, making a passage from the train pipe to the whistle. The air in the train pipe under the cars thus passes through the whistle, causing it to sound, warning the engineman that the angle cock is shut off.

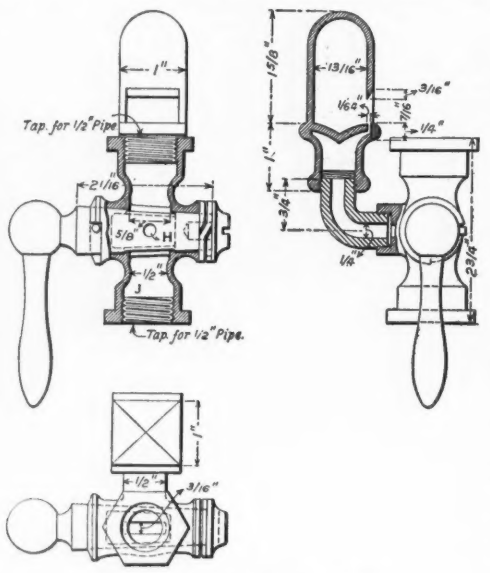


Fig. 3.—Detector Cock and Whistle.

In this position the engineman can regain control of his train by turning the handle of the signal cock down, as shown in Fig. 3, thereby shutting off the whistle port and opening a communication for the air to pass through from the train-pipe that runs to the front of the pilot by way of the auxiliary pipe, through the signal cock and so back under the tender through *E* in the angle cock, and through the hole *F* and the opening *O*, to the train-pipe under the cars. By using a half-inch auxiliary pipe an emergency application can be made.

A Copper-Sheathed Passenger Coach.

The New York, New Haven & Hartford has just turned out of its New Haven shops a coach which embodies a decided novelty in passenger car construction. The idea is the invention of Mr. W. P. Appleyard, Master Car Builder of the company; it consists in sheathing the exterior of the car with sheet copper of No. 30 gage.

So far only one car has been sheathed. This has the narrow outside sheathing which is now so much used and is standard on the New Haven road. Each board of this sheathing has been separately covered with the copper, which is lapped over into the groove and around the tongue, the boards being then attached to the car in their proper places as in ordinarily finished cars.

Where the window panels and the outside window sills meet, the copper covering of the window sill is carried up back of the panel. This is also the case where the window lintel and the letter-board come together. Here the copper on the lintel is extended up under the letter-board. The same is true with many other joints. In fact, wherever it was possible, the joints were flashed in this manner, thus making the car as nearly water-proof as can be. The sheathing shows no indentation or marking on the exterior, presenting an unbroken surface. The outside sills and lintels of the windows, the letter board and the spaces between the windows are also covered with the copper, so that the entire exterior of the car, except the doors, window sashes, hoods, platform and the roof are finished with the copper sheathing. All painting and varnishing of the exterior of the car is done away with, except the painting of the doors and other parts just named. The numbers and letters on the car are made of cast brass or aluminum, as desired. The plating of the wooden sheathing is effected by a simple machine which any railroad can construct at its own shops. Each piece of sheathing, with its copper plate, is passed through the machine simultaneously and comes out ready for use.

The copper was oxidized after it was put on the car to give it a permanent color, but the oxidation is a matter of taste. The copper can be put on in its red state as it comes from the rolling mills. In a short time it will be evenly oxidized by the atmosphere to a rich bronze tint. The car is expected after years of service to present as handsome an appearance as now when it has just left the shops. This car is especially handsome. The color is quite dark and closely resembles the standard color of the passenger equipment of the New York, New Haven & Hartford.

Some of the advantages of this metal plating are immediately obvious. The car can be entirely sheathed in eight days, thus saving the considerable time needed in painting and varnishing cars. There will be no deterioration in the appearance of the car; it will be as fresh in appearance after years of service as when new. Moreover, there will be no reason for sending the car into the shops to be "touched up;" every passenger car which is kept in good condition spends an average of three weeks every year in the shops being "touched up" and revarnished. All that time can be saved and the car kept on the road in service. If the body of the car is damaged in a wreck or badly scratched those boards of the sheathing which need repairing can be easily detached and re-sheathed. The parts not damaged do not, of course, need any attention, whereas, if any portion of the side of a painted coach has been scratched enough to need repainting the entire side of the car has to be varnished to make it uniform. Where it would be necessary to keep such a car in the shops a week or over to paint and varnish, a car with the copper sheathing, with no more serious damage, could be repaired in a few hours; the copper can also be generally saved and rerolled. If the copper is so badly torn as to prevent this, a salvage of eight or nine cents a pound about half of the original cost of the metal, can be obtained.

The cost of sheathing a car with copper, it is believed, will not exceed the cost of painting and varnishing. A much less expensive grade of lumber may be used under copper plating than under paint and varnish. In considering the cost, a further element of economy than the saving of time in the shops is the greater convenience in handling a car finished in metal. This car, which was an old one, going into the shops to be overhauled, was repaired and sheathed on the erecting track without being moved from that track. If it had been painted and varnished, of course, it would have been necessary to transfer it to two or three other tracks and, perhaps, as many buildings.

The weight of this car, Mr. Appleyard states, was no increased. In fact some saving seems to have been made. The weight of the copper used is about 1,000 lbs. The weight of the paint and varnish needed to finish a similar coach may be assumed as from 275 lbs. to 300 lbs., so that there is a difference of about 700 lbs. to be made up to keep the weight within that of a painted coach. This has been accomplished by thinning the sheathing and wooden members enough to compensate for the difference between the weight of the copper and of paint and varnish.

Copper is not the only metal which is adaptable for this purpose. Aluminum, for instance, could be used, and the advertising which might be obtained by running a train of cars so finished will probably appeal to some general passenger agents.

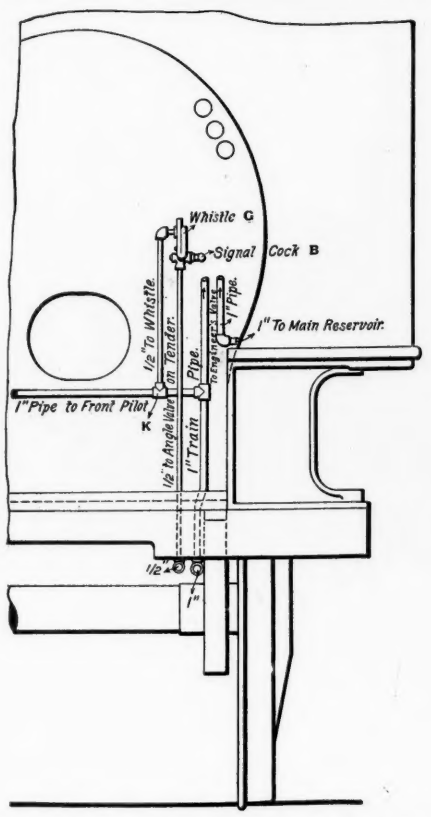


Fig. 2.—Application of Wheeler's Detector for Closed Angle Cock.

Nut and Bolt Works Operated by Electricity.

Although the transmission of power outside the limits of Niagara Falls is not yet two months old, a large nut and bolt works at North Tonawanda, N. Y., fully equipped, has been waiting for the current for the past year. These works, the largest nut and bolt factory in the country, are those of Messrs. Plumb, Burdict & Bernard.

When the electrical equipment was under consideration, the question of utilizing Niagara power naturally arose, and the three-phase system was selected. And now that it has been chosen for the transmission of power from Niagara Falls to Tonawanda and Buffalo, the bolt and nut works can be operated directly from the transmission line by connecting the necessary static transformers.

The factory is about half a mile from the route of the overhead wires of the Niagara-Buffalo transmission. All the work, with the exception of the cold work, starts at the forge shop and passes on through the various operations to the finishing shop, each succeeding operation being set next to the previous one.

Until Niagara power can be obtained the works are being operated from their own generating station, which will be abandoned as soon as the Niagara Power Company is ready to tap the three-phase lines into the factory. The generating station is between the cold and machine shops in the central building. Steam is supplied by three Riter Brothers return-tubular boilers, each

of 100-H. P. capacity. The engine is an improved Green type of 400 H. P., belted to a General Electric Co. three-phase, six-pole, 150-KW., 25 cycle, 500-R. P. M. generator The exciter is a 3-KW., 125-volt bipolar machine. The switchboard is of panel type, built up of two panels, one for the generator, the other for the feeders. The generator panel carries potential indicator, two current indicators, field switch, main switch and two Carpenter enamel rheostats. The feeder-board, in addition to the fuses, is equipped with four three-blade knife switches, each controlling one circuit and labeled "Cold Press," "Machine Shop," "Thread Shop," "Forge Shop," respectively.

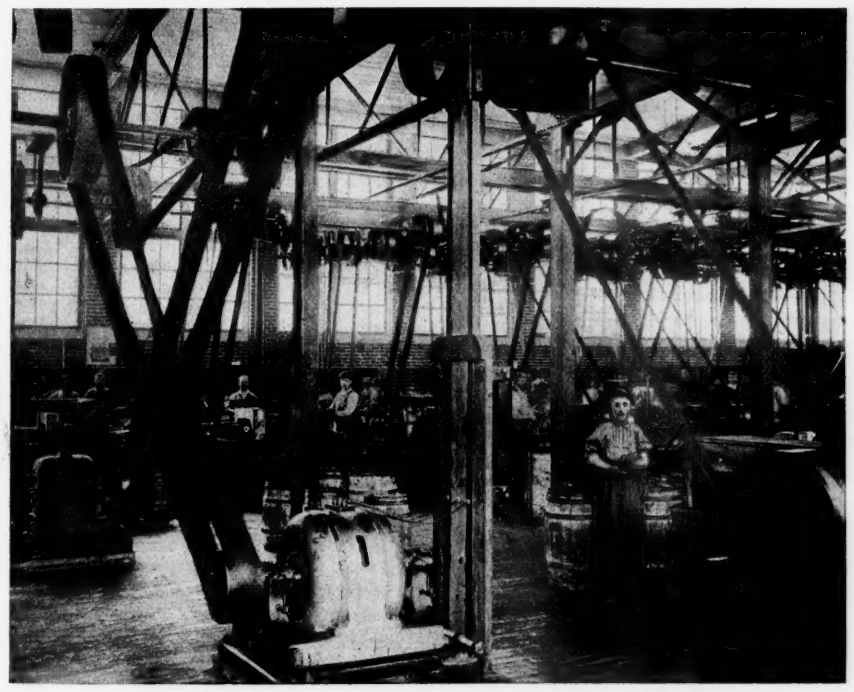
The forge shop is about 360 ft. long, having the forges and machines down each side of a central isle, along which a track is laid. Above the machines, on each side, runs a line of shafting, and in arranging the line of shafting a simple method has been used. Suspended from the roof girders, down each side, are four lines of channel iron in two sets, each set bolted back to back. Each line is separated from the other about 20 in. Through the space between each pair of channels, pass long bolts, which support the hangers for the shafting and allow of a ready rearrangement at any time. This method is adopted throughout the shop.

The forge shop contains five 20-H. P. General Electric induction motors, four driving the shafting and one operating a blower. The shafting is divided into four sections, and each one is belted to one of the induction motors.

The driving motors themselves are set upon a platform above the shafting in the center of the shop, and are boxed in. The blower motor directly connected to the blower occupies a platform at the south end of the shop. The machinery driven by the motors in the forge shop is different sizes of bolt headers and nut punchers and shearing machines for shearing the bolt lengths from the rod. In the cold shop the pointing department is operated by one 20-H. P. motor, set on the floor and belted to jack-shafts and countershafts as necessary. In the machine shop, lying on the south side of the engine-room, is another 20-H. P. motor, also set on the floor. It is used to drive a variety ef tool-making machinery, such as planers, milling machines, drills, slotters, shapers, etc.

The treading and finishing shop, 400 ft. long, is next in length to the cold shop, which is 430 feet in length. In it the bolts and nuts traveling from the other shops are threaded and tapped and put together ready for the market. This threading and tapping of the smaller pieces is effected automatically for some and semi-automatically for others and the operations involve some good automatic and semi-automatic work, particularly that of the automatic nutters which put the nuts on the bolts.

The shop is driven by six 6-H. P. motors set on small platforms, and three 20-H. P. motors. The smaller



Two 20-H. P. Induction Motors in the Threading and Finishing Shop.

motors and one 20-H. P. motor are used to drive the automatic and semi-automatic machines. For the former they are belted to jack shafts from which belts are dropped to pulleys on a shaft running underneath the machinery. For the semi-automatic machinery, the pulley is on the level of the machines and is belted to the jack shaft above.

The other 20-H. P. motors are set on the floor and are belted to shafting on the opposite sides of the shop. These serve to drive the heavy threading and tapping work not automatic and some idea of the variety of machinery in these shops, and the work the motors are called upon to do, may be gathered from the fact that the sizes of bolts made run from $\frac{3}{16}$ in. up to $1\frac{1}{2}$ in.

The advantages of electric drive are markedly noticeable in this plant. There are no separate engines for the individual shops and no belt holes in the walls. The wires come through three small, porcelain-bushed holes in the wall of each shop. The central steam and generating station is now confined to one room and will probably shortly be entirely abolished. The motors in the forge shop occupy no space on the floor of the shop and those in the other shops occupy either small space on the floor or are erected on small platforms. They require no attention beyond the filling of oil wells, which is performed but once in six months. They are started by throwing a switch, and maintain a steady and constant speed under all conditions of load.

Electric Power from the Falls of St. Anthony.

The contract for the utilization of the Falls of St. Anthony at Minneapolis for electric power has been awarded to the General Electric Company. Some time since the St. Anthony Water Power Co. and the Pillsbury flour mills and elevator lines were merged into the Pillsbury-Washburn Flour Mills Co., which controlled not only most of the developed water power of the Falls, but also the undeveloped water power below the Falls.

Corner of Machine Shop, Showing 20-H.-P. Induction Motor.

A dam was constructed and the total available power has been calculated at 10,000 H. P.

The water will pass through seven turbines, each of 1,000 H. P. capacity, of Stillwell Bierce-Smith Vaile manufacture. The electric apparatus will consist of a plant comprising both direct-current generators for the street railroads of Minneapolis, and three-phase apparatus for transmission of part of the power for a distance of 10 miles into St. Paul.

The direct-current portion consists of two 700-KW. multipolar generators, with a speed of 130 revolutions per minute, furnishing a current of 600 volts, and two 100-KW. exciters for the three-phase alternators. The three phase generating plant consists of five 700-KW. alternators with a frequency of 35 cycles, and an initial electric pressure of 3,450 volts. This will be raised to 12,000 volts in six step-up transformers of the well-known air-blast type, and at this voltage the current will be carried to St. Paul. At St. Paul the pressure will be reduced in 15 step-down transformers, and the current will be led into five rotary converters of a special type, resembling in appearance those installed in the power-house of the Buffalo Street Railway Co., in connection with the Buffalo-Niagara Falls transmission plant, and which was illustrated in the *Railroad Gazette*, Dec. 4, 1896. The converters to be placed in St. Paul are eight-pole machines, each of 600 KW. capacity when running at 520 revolutions. They are designed to operate in parallel with each other or with the generators now driven by steam in the existing station.

When completed the new plant will be operated by the Twin City Rapid Transit Co., which will send about 3,000 H. P. to St. Paul, leaving 4,000 H. P. to be used in Minneapolis. When the power is employed to run the street cars, the street railroad will use the Thirty-first street power station for other purposes. The main power station at Third avenue (north) and Second street will be used, while the power station at St. Paul wil be kept ready for emergencies.

Protection from Car Fires.

By an act passed by the General Assembly of the State of Ohio, April 27, 1896, all railroads operating within the state are required, within one year from that date, to carry as part of the equipment of passenger trains at leas one portable chemical fire extinguisher for protection to passengers and employees in case of fire. They are further required to add each year one fire extinguisher to every train until each passenger coach is supplied, provided the cost does not exceed $15 each. The extinguisher used is first to be approved by the Commissioner of Railroads and he is directed to invite and encourage the most extended competition. The Commissioner is also to designate on which car of the train the first extinguisher shall be placed and also every subsequent one added. It is left to the Commissioner to determine where in each coach the extinguisher shall be placed, how attached, and to see that the provisions of the act are carried into effect. For a violation of this act a fine is to be imposed, ranging from $25 to $100, and each day trains are run contrary to the provisions will constitute a separate offense.

Reprerentatives from all the railroads operating in and through Ohio met at the Columbus shops of the Pennsylvania lines, Jan. 15, and witnessed tests of chemical fire extinguishers, as made by a number of manufacturers, to determine which class of machine was the better, the air or the acid. From these tests, the different railroad companies have prepared specifications for extinguishers which differ materially from those got up by the Railroad Commissioner some time ago These specifications will be presented to the Commissioner, who will make the final decision.

The Uses and Economy of Compressed Air in Shops.

At the November meeting of the New York Railroad Club, Mr. Curtis W. Shields presented a paper in which he discussed the generation, transmission and application of compressed air, with special reference to its use in railroad shops. The theoretical considerations were first taken up and a diagram given, showing the state of the air in a cylinder during the different stages of adiabatic and isothermal compression and expansion. The question relating to the lost work due to the heat of compression is a most important one, from an economical standpoint, and Mr. Shields showed the percentag of work of compression which is converted into hea and thereby lost when no cooling apparatus is used, and followed it by a table compiled by Mr. F. C. Weber, giving the per centage of work lost from the same cause for different pressures by using a one, two and four-stage compressor. We give a few of these results as showing that the loss when compressing air from a reasonably high pressure (say 800 lbs. per square inch), to what may be regarded as a very great pressure is but a small percentage of that which is lost in compressing from atmospheric to the lower of the two pressures.

PER CENT. OF WORK LOST DUE TO HEAT OF COMPRESSION.*

Gage pressure.	One stage.	Two stage.	Four stage.
	Per cent.	Per cent.	Per cent.
60	23	11.8	4.15
100	27.58	14.62	7.41
800	47.4	26.33	14.32
1,200	51.6	28.60	14.85
1,600	53.3	30.0	15.54
2,000	54.8	30.8	16.65

* Isothermal compression as base line.

In order to use air advantageously in a compressed-air motor working under a pressure of 2,000 lbs. per square inch, the 16.65 per cent. of work which is lost by using the four-stage compressor must be regained if we are to have an economical machine; compressed air in its application to useful work is hampered, inasmuch as its temperature is increased when it is compressed and decreased when it is expanded. In order to compensate for the loss due to compression in the Hardie motor, the air is re heated in a hot-water tank, and General Herman Haupt, in referring to this heater, makes the following statement:

"The power required to compress 1,000 cu. ft. of free air to 2,000 lbs. per minute would be 400 H. P. consum-

ing 1,200 lbs. of coal per hour at a cost of $1.80 (at $3 per ton), and the cost of reheating would not exceed 22 cents to double the work performed. That these statements are not mere theoretical deductions have been proved by actual tests. The Rome air motor, when using a reheater, ran 14 miles on a consumption of 308 cu. ft. of free air per mile. When the air was not reheated, the consumption of air per mile was 661 cu. ft."

The object of reheating the air in the Rome (or Hardie) air motor, which we discussed at some length in our issue of May 29, 1896, may be appreciated from the above remarks.

Mr. Shields then takes up the question of the economy of installing different kinds of compressing plant for light work and makes the following calculation:

Test of 8-in. brake pumps have been made in which it was found that for every pound of steam passing through the pumps there was, on the average, about 2.25 cu. ft. of free air compressed to 70 lbs. pressure. For every 1,000 cu. ft. of air compressed there is, therefore, required 445 lbs. of water, and if the evaporation of the boiler supplying the steam is taken at 8, the coal required is 55.6 lbs. The capacity of one 8-in. pump with 80 lbs. of steam is about 1,000 cu. ft. per hour, and if we assumed that the pump ran the equivalent of 10 hours per day for 300 days in a year, the annual coal consumption is 55.6 × 10 × 300, or 83 tons. As it is seldom that a single pump is of sufficient capacity for a yard or shop, and as even the smallest belt compressors are usually of the capacity of two such pumps, we will make a comparison on the basis of 2,000 cu. ft. of free air compressed per hour, requiring two pumps consuming 166 tons of coal per year.

We find by investigation that in those driven by belts about 2.8 H. P. is required at the belt for each 1,000 cu. ft. of air compressed per hour. If the shop engine consumes 3½ lbs. of coal per horse-power per hour, and the loss in transmission by shafting, belts, etc., is 40 per cent., the coal per horse-power at the compressor becomes 3.5 ÷ .6 = 5.8 lbs., and for compressing 2,000 cu. ft. of air it is 2.8 × 2 × 5.8 = 32.4 lbs. For a year of the same number of hours as before, the consumption is 32.4 × 10 × 300 = 48½ tons.

In a steam compressor, the horse-power per 1,000 cu. ft. of air compressed, including the internal friction of the engine, we will take as 3.2, though it will vary somewhat with the construction of the compressor. In one having only 2,000 cu. ft. capacity per hour, a horse-power cannot be expected on less than 4½ lbs. of coal with the evaporation we have assumed and it might easily be more. Taking it at that figure, the annual consumption would be 3.2 × 2 × 4.5 × 10 × 30 = 43 tons.

It appears to us that the above calculation is unreliable. When using a compressor driven by belts, he assumes the shop engine consumes 3½ lbs. of coal per horse-power per hour, and the loss in transmission by shafting, belts, etc., to be 40 per cent.; whereas in the steam compressor he takes the horse-power per 1,000 cu. ft. of air, including friction, as 3.2, an unreasonably low figure. It will be seen that he gives the advantage to those driven by belts as far as the number of pounds of coal per hour per horse-power is concerned, and on the other hand favors the steam compressor by giving a very low value for the horse-power per 1,000 cu. ft. of air compressed, which value includes the internal friction of the engine. He obtains the results that he does by working with values that are mere assumptions. Let us suppose, for instance, that the loss in transmission by shafting, belts, etc., is 30 per cent. instead of 40. Then 3.5 ÷ .70 = 5.0 lbs. of coal per horse-power, at the compressor .2.8 × 2 × 5 = 28 lbs. for compressing 2,000 cu. ft. For the year the consumption is 2.8 × 10 × 300 = 84,000 lbs., or 42 tons, which is almost exactly the same value he obtains for the steam compressor. His figures for the 8-in. brake pump are based on tests, and we have pointed out the places of possible error in the other cases in order to show that results obtained by assuming quantities that may have a wide range of values are not conclusive.

Mr. Shields then makes a comparison between a compressor with 18,000 cu. ft. of free air per hour and the pumps of the same capacity, and finds that the compressor almost pays for itself in one year with coal at a dollar a ton.

The question of the use of compressed air in shops for hoisting and other work is considered as follows:

In many shops all the hoisting, as well as many other important operations, is done by means of compressed air; and if, for any reason, the air supply is stopped, it practically brings the whole establishment to a more complete standstill than if the shop engine were to break down. In fact, such an accident as would necessitate the stoppage of the main engine loses most of its terrors when the shop is fitted with an adequate air plant, because most of the machinery can be driven by attaching small portable air-driven simple engines to groups of tools. These air-using engines, mounted on trucks, are used in a number of shops for overtime or Sunday work. One boiler in the battery usually suffices to operate the compressor; and by belting these small engines to the group of tools it is desired to run, the loss of power incident to running all of the main shafting is saved.

In piping the shops, there seems to be a tendency to install auxiliary air receivers in each shop or near each tool that consumes much air. It appears hard to account for the reasoning that urges the adoption of this policy. The main reason for having a receiver is to do away with the pulsations of the compressor and furnish air at a constant unvarying pressure, and this is accomplished at the main receiver. The piping to the various shops should be of such a size as will supply the volume of air needed with least frictional loss, and in itself acts as an auxiliary receiver. If troubled with moisture, an ordinary separator is the remedy.

In shops where heavy tools make large demands upon the air supply, it is best to run the air through a reheater just before it is used. A spiral coil of pipe, heated by a gasoline or naptha burner, is the cheapest and handiest device for this purpose, and is of light weight and portable.

The reader is referred to articles which appeared in the *Railroad Gazette* of Sept. 26, Dec. 4 and Jan. 15 and 20, for further information in regard to the application of compressed air in railroad shops. Mr. George A. True, of the Whiting Foundry Equipment Co., Harvey, Ill., estimates the saving by the use of compressed air for a small plant using four hoists in a shop, as follows:

Take the case of a small plant using four hoists of 6 in. in diameter each; the average cost would not exceed $45 each, making for the four, $180. A suitable compressor with ample surplus power and a receiver with all valves, piping, hose, etc., ought to be supplied for about $250 additional, making the cost of the plant $430, or allowing for installing, say, $500. This is a liberal allowance, and the interest on this sum, we will say, is $30, and we will allow $30 more for repairs and depreciation. Four chain hoists of one ton capacity each, for operation by hand power, ought to be supplied and erected for $100, so that the difference in cost is practically $400 between air and hand power plants of this capacity. We will assume that each hoist makes 30 lifts per day; this equals 120 lifts of 4 ft. each, or 480 ft. total lift, or, allowing a ton for each hoist, 480 ft. tons per day. By hand power, at two ton-feet per minute, it would occupy about four hours to handle these loads. By air it would occupy about 24 minutes actual hoisting time, resulting in a saving of over 3½ hours per day, which at 20 cents per hour would amount to, say, 78 cents, and deducting the amount or cost for power we would have 75 cents per day saving in labor, or $225 per year. Deducting interest, we would have $165 to $175 net saving per year in favor of compressed air in a very small and uneconomical plant.

Mr. Shields believes that the above is hardly a fair comparison, as only one man's time is allowed on the chain hoist—whereas in actual practice two men more often operate the chain—and the saving of the time of the mechanic kept waiting for the hoist to be made, and the work put in place for machining, is ignored.

Many of the members of the club took part in the discussion which followed this paper. Mr. A. E. Mitchell (Erie Railroad) spoke, in part, as follows:

The author has very carefully considered the loss of pressure due to heat, etc., which is an exceedingly valuable consideration if we are to compress air in immense quantities, as they do at the mines and such other points, but for the small consumption of air that we use in our shops—something like 1,000 ft. of free air a minute, I feel that the usual air compressor, as built by the representative air compressor companies of the country, will give us very good service if the air cylinder is properly jacketed with water. I think that it would pay us better to put up one steam compressor costing $2,000 than to try to compress air with two second-hand pumps whose value is $100.

Mr. Wm. Saunders spoke at some length in regard to generation and transmission of compressed air. Without giving any particulars as to the construction of the motor-car, he said that the company with which he is connected (Ingersoll-Sergeant Drill Co.) is building a compressor at Easton which will supply air to propel a car on the Sixth Avenue Railroad between Rector street and Central Park, and is designed to be a very high duty machine.* It will compress the air in four stages up to a pressure of 2,000 lbs. per square inch, and between each stage there is an inter-cooler which will reduce the temperature. He stated that they had reduced the clearance down to a very low figure, so that the loss from it was inappreciable. He also referred to the friction loss, and stated that he had results of tests taken with the utmost care which show a friction loss of from 3 to 7 per cent. on a machine with duplex air cylinders 24 in. in diamter and 48-in. stroke. In regard to transmission Mr. Saunders said:

We know that compressed air can be transmitted to any practicable distance. The only question is whether we will put it in pipes large enough to make it economical. I do not think it would be economical to convey it from Niagara Falls to Buffalo to give the power they want there, because they want a very large amount of power at Buffalo, and in order to get this it is necessary to have a very large pipe line. For 250,000 H. P. it would take a pipe about 40 ft. in diameter, which is too large to be a commercial success, and the only alternative in that case would be to subdivide into horse-powers of 50,000, and these would each take a pipe of about 4 or 5 ft. in diameter.

Mr. Parke, of the Westinghouse Air Brake Co., did not believe that an air-brake pump is at all adapted for the purpose of affording a commercial supply of compressed air. Referring to the use of compressed air in railroad shops, he said:

It is quite common in railroad shops to use compressed air very largely for hoists and that sort of thing. It is well known that where air is used in a hoist it is absolutely impossible to use it expansively. It is required that the whole pressure of the air shall be exerted upon the piston of a hoist, in order to do the work, and therefore it is not possible to expand the air as you may in running the motor. It has, however, become customary, in quite a large number of shops, to place small air motors on trucks, which can be moved from one place to another as the case demands, and they are used to operate detached machines when the power of the shop is shut down. I think it would be found that, in all such cases, it would pay very well indeed to consider the question of reheating the air before it goes into the motor.

Mr. George S. Strong concluded the discussion with the following words:

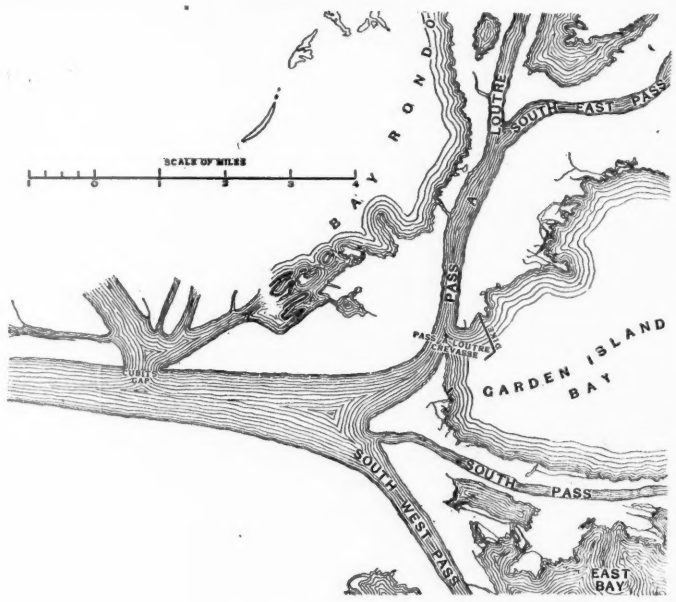
Now, as to the question of compression of air by the most economical method. If I were to go in for a plant to-day to get the highest economy, I would use a gas engine or a compressing engine, and if I were going to equip a large plant, I would put in a gas-generating plant and generate gas which I would distribute to the different points desired and then, if I wanted to use compressed air for shop purposes, I would compress the air with a gas engine. You can do it more cheaply than the other way; in fact, you can get a horse power from seven-eighths of a pound of coal at the compressor, whereas the best Corliss engine uses about two pounds of coal to produce a horse-power.

* Since the above was written, we have learned that the compressor referred to is being installed at No. 100 Greenwich street for the American Air Power Co., of 160 Broadway, to supply compressed air to the Hardie locomotive now being built at Rome, N. Y.

The Pass a Loutre Crevasse.

In 1891 a break occurred in the right bank of Pass à Loutre about one and a half miles below the head of South Pass. Several efforts have been made by the legal representatives of the late James B. Eads to close this break, as it bids fair to reach such magnitude as to materially diminish the flow through the passes, and thus became a menace to navigation between the Gulf of Mexico and deep water in the Mississippi River.

The crevasse is now about 2,220 ft. wide with a maximum depth at the entrance of 60 ft. It flows into Garden Island Bay, which is quite shallow, the depth averaging about 6 ft.



The Pass a Loutre Crevasse.

A dike 8,350 ft. long was built in shallow water for the purpose of closing the crevasse. This was destroyed by a violent storm when nearly completed. The dike was rebuilt and strengthened with sheet piling, but was badly wrecked by a second storm, which occurred in October, 1894. After the destruction of this dike the project of closing the crevasse was abandoned by the jetty contractors. An effort is now being made to secure an appropriation of $250,000 from the present Congress to close the break.

The crevasse undoubtedly has considerable influence on the condition of the channel through South Pass and the jetties, and it is, therefore, only prudent to close it as soon as practicable. If allowed to flow, it would ultimately form a delta in Garden Island Bay similar to the one formed by Cubitt's Gap above the head of the passes, and numerous other passes in that locality. The volume of flow would rapidly diminish as the delta extended seaward, and its influence as a factor in the maintenance of navigable channels would then vanish. This is of course too slow a process to rely upon and the results must be anticipated by artificial works.

J. A. OCKERSON.

United States Railroad Statistics for 1896.

The Statistician of the Interstate Commerce Commission has issued his preliminary report on the income and expenditures of railroads in the United States for the fiscal year ending June 30, 1896. The principal items in this report were given to the daily papers about six weeks ago, but the official pamphlet has only just appeared. Figures from the similar report for 1895 were given in the *Railroad Gazette* of Nov. 29 of that year, but no exact comparison can be made between the two years because the number of companies reporting is different, and the total mileage may not represent the same roads. The principal items now given are:

Number of companies reporting	652
Mileage of road reporting	172,369
Earnings from passengers, mail, express, etc	$323,468,891
" " freight	772,071,374
" miscellaneous	28,012,917
" unclassified	93,380
" total	1,123,646,562
Operating expenses	754,971,515
Net earnings (*a*)	368,675,047
Other income (*b*)	34,045,651
Total net income (*a* + *b*)	402,720,698
Fixed charges	341,408,299
Dividends paid	54,983,732
Surplus from operations of year	6,328,667

Earnings and expenses *per mile* of road are reported

for five years. The figures for 1896 are for 172,369 miles, or about 96 per cent. of the total, but those for the other years are taken from the final, not the preliminary, reports, and include all the roads from which reports are received. These comparisons show:

	1896.	1895.	1894.	1893.	1892.
Passengers, mail, express, etc...	$1,877	$1,764	$1,961	$2,120	$2,104
Freight.....	4,479	4,130	4,002	4,906	4,946
Total, inc. misc. and unclass'd...	6,519	6,050	6,109	7,190	7,213
Oper. expenses.....	4,380	4,083	4,163	4,876	4,809
Net earnings.....	2,139	1,967	1,946	2,314	2,404

The increase in earnings in 1896 over 1895 is fairly well distributed throughout the country, though in group 9, lying mostly within the state of Texas, net earnings have fallen from over 13 millions to 10 millions. This loss is in freight earnings, which decreased from $3,356 gross, per mile, to $2,965. The surplus from the operations of 1896, though small, represents a marked increase, the previous year having shown deficits aggregating over 31 millions. Group 9 shows a larger deficit than the previous year, but in all other groups there has been an improvement, though groups 3, 4, 7, 8 and 10 continue to fail to show a surplus.

New Malleable Iron Journal Box.

The Drexel Manufacturing Company has on exhibition at its offices in the Rookery Building, Chicago, a journal box, which, while conforming to the dimensions of the M. C. B. standard box, is provided with a top hinged lid designed especially to prevent dust from entering the box and wasting of the oil by leaking past the lid.

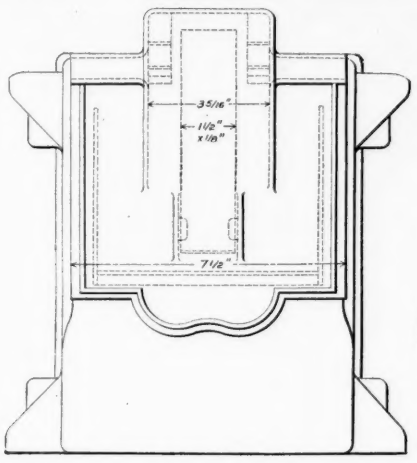


Fig. 1.

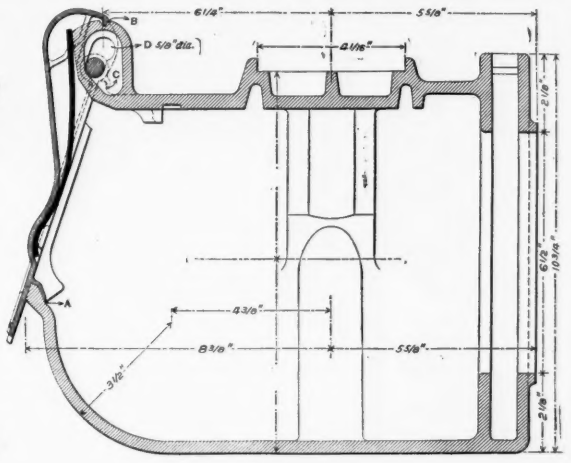


Fig. 2.

Malleable Iron Journal Box.

The accompanying engravings show the box for a 4½ in. × 8 in. journal. Fig. 1 is a front view and Fig. 2 a section through the box with the lid closed, and shows how the lips *A*, *B* and *C* are cast to form a tight joint. At the bottom of the ⅝-in. hole, *D*, is a ⅛-in. slot in which the bolt rests when the lid is closed. To open the lid, it is first raised into the position shown in Fig. 3, being guided in this operation by stops cast on the inside of the bulge. The lid is then rotated into the position shown by Fig. 4, the stops riding upon the lug, on the face of the box, until opposite the portions cut away at *E*. Until this position is reached the pivot bolt is held at the upper limit of the slot, but after passing this point it is free to slide.

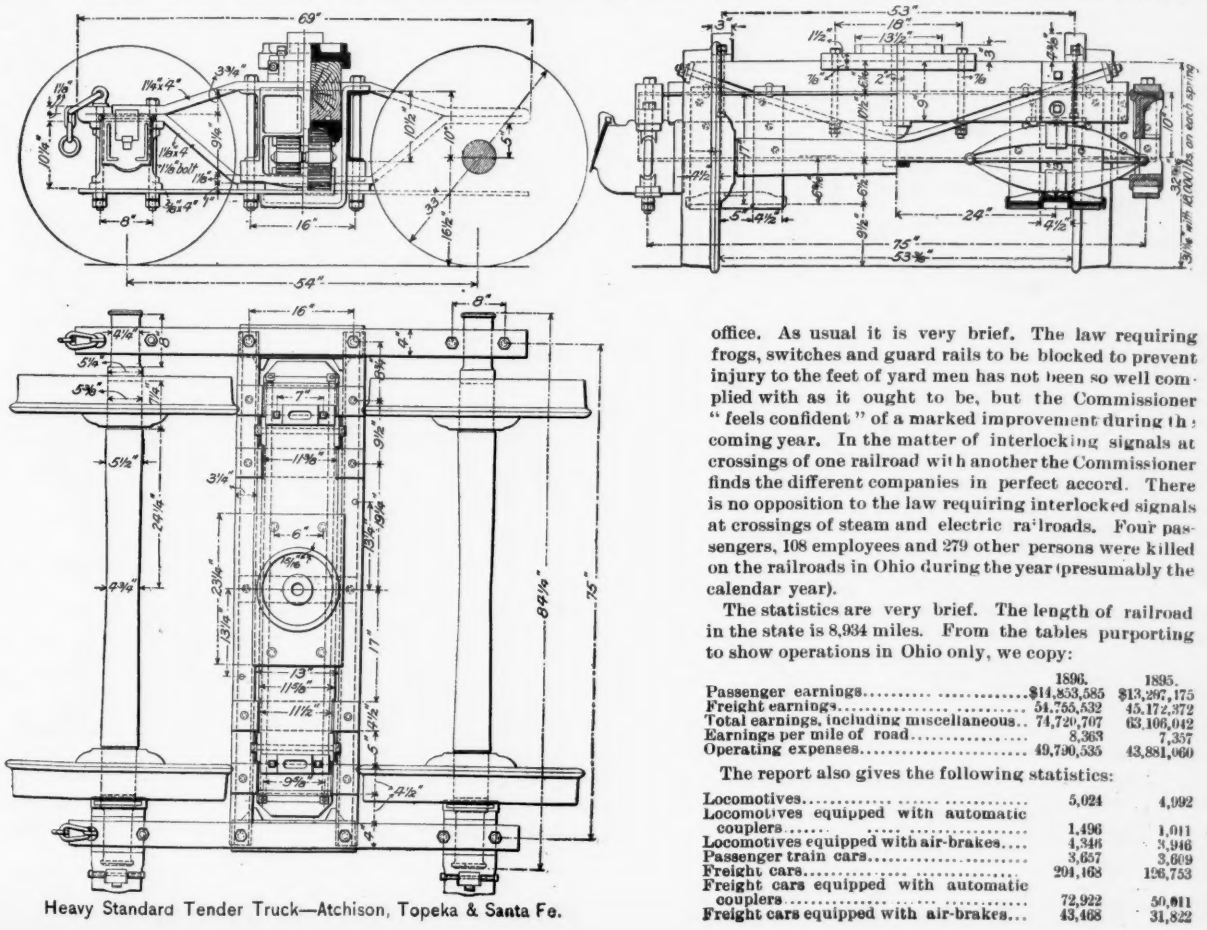
The spring has ⅛ in. less compression when the lid is at the bottom than when in the position shown in Fig. 3, so that the spring keeps the lid tightly closed, and when in this position the lips act as a lock.

These lids have the same number of pieces as the standard M. C. B. lids and are interchangeable with them, but when so used the advantage of a tight fit is lost.

The boxes are made of malleable iron and weigh about 60 per cent. as much as a similar cast-iron box. The advantages claimed are those arising from the use of a tight journal box.

Heavy Standard Tender Truck, Atchison, Topeka & Santa Fe.

Through the courtesy of Mr. John Player, Superintendent of Machinery of the Atchison, Topeka & Sante Fe Railroad, we illustrate here the heavy standard tender truck of that road. It is of the rigid diamond type with 10½ in. channel transoms, the bolster not extending through the bolster column casting, but being kept from lateral motion by guide blocks held between the two 4½ in. × ¾ in. wrought iron spring seat hangers. The bolster is of oak, trussed with two 1⅛-in. rods, and on the front truck has no side bearings, being also cut down ¾ in. for center plate. Both center plate and side bearings are cast iron. The bottom spring seats are malleable iron, as are also the bolster columns. The top arch bar is 4 in. × 1¼ in. and the bottom 4 in. × 1⅛ in., bent back on the ends to receive the thread of the top arch bar. M. C. B. standard journal box, brass and wedge for 60,000-lb. cars, and the Morris pressed steel lid are used. The springs are the double elliptic type.



Heavy Standard Tender Truck—Atchison, Topeka & Santa Fe.

Compressed Air Locomotive.

Within a few weeks a Hardie compressed air locomotive, now under construction at Rome, N. Y., will have a trial on the Sixth avenue line of the Manhattan Elevated road. The engines which will be used to compress the air are now being placed in position at 100 Greenwich street, and the four-stage compressor which is now being built at Easton, Pa., by the Ingersoll-Sergeant Drill Co., will be ready in a short time. It is designed to compress to 2,500 lbs., but the air in the locomotive will be stored at 2,000 lbs. per square inch so that there will be practically no strain on the compressor at any time. Air will be compressed in four stages, and the temperature will be reduced between each stage by means of an intercooler.

The locomotive will be a modification of the street car motors which have been running on 125th street, New York, for the past six months. Anyone desiring to study the subject closely will find the principles on which the Hardie motors work discussed in our issue of May 29 1896. In that article we published a cut showing the details of the machinery in the street car motor and dwelt at some length on the question of the object of the reheater. The tanks on the motor referred to have a capacity of 51 cu. ft., while those for the compressed air locomotive to be used on the elevated road will have a capacity of about 200 cu. ft. The air will be stored in reservoirs consisting of 36 Mannesman rolled steel tubes, 9 in. in diam. and 15 ft. 6 in. long. These tubes are tested to a pressure of more than 4,000 lbs. per square inch. Twelve pipes, with three branches to each, connect these reservoirs with a large vertical heater, which raises the temperature of the air before it enters the working cylinders of the locomotive. These cylinders will be 13⅞ × 20 in.; the working pressure will be 150 lbs. per square inch, which is the same as that on the street car motors. It is our purpose to publish a detailed description of this locomotive with drawings in a subsequent issue.

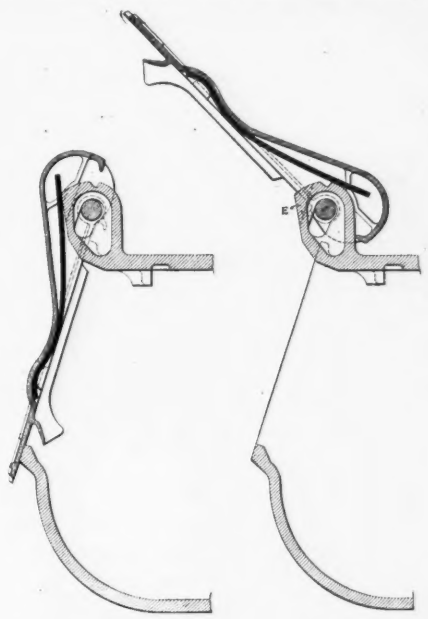


Fig. 3. Fig. 4.

The compressed air motors which are to be tried by the Metropolitan Traction Company will be made by the Compressed Air Power Company, of which Joseph H. Hoadley is President; A. H. Paget, Secretary, and William C. Whitney and W. L. Elkins are among the directors.

Ohio Railroad Commissioner's Report.

The Railroad Commissioner of Ohio, Mr. William Kirkby, has issued the twenty-ninth annual report of his office. As usual it is very brief. The law requiring frogs, switches and guard rails to be blocked to prevent injury to the feet of yard men has not been so well complied with as it ought to be, but the Commissioner "feels confident" of a marked improvement during the coming year. In the matter of interlocking signals at crossings of one railroad with another the Commissioner finds the different companies in perfect accord. There is no opposition to the law requiring interlocked signals at crossings of steam and electric railroads. Four passengers, 108 employees and 279 other persons were killed on the railroads in Ohio during the year (presumably the calendar year).

The statistics are very brief. The length of railroad in the state is 8,934 miles. From the tables purporting to show operations in Ohio only, we copy:

	1896.	1895.
Passenger earnings.....	$14,853,585	$13,297,175
Freight earnings.....	54,755,532	45,172,372
Total earnings, including miscellaneous..	74,720,707	63,106,042
Earnings per mile of road.....	8,363	7,357
Operating expenses.....	49,790,535	43,881,060

The report also gives the following statistics:

Locomotives.....	5,024	4,992
Locomotives equipped with automatic couplers.....	1,496	1,011
Locomotives equipped with air-brakes....	4,346	3,946
Passenger train cars.....	3,657	3,609
Freight cars.....	204,168	126,753
Freight cars equipped with automatic couplers.....	72,922	50,011
Freight cars equipped with air-brakes...	43,468	31,822

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The Mayor and Aldermen of Kansas City (Kan.) recently asked the Railroad Commissioners of their state to order a reduction in freight rates on grain to that city, in order to enable the proprietors of elevators there to get a larger share of the business; or, to put it in different language, to give the dealers there a better chance to get a commission out of the large volume of grain that is moving from the interior of Kansas to Eastern cities. But the Commissioners have refused to make the change, delivering to the petitioners the following indigestible morsel of cold truth:

"The board finds that the interests of the Kansas grain producers and those of complainants are not identical, but are so dissimilar as to be antagonistic and that it would be injurious to the Kansas grain producer to have rates so manipulated as to compel stoppage of their products at any point other than the point of ultimate destination. The collective interest of Kansas producers transcends in importance the interests of the grain dealers of complainant's city, or the interests of complainant's city as a commercial center. The board does not regard as unjustly discriminative a system of rates which permits producers to reach points of ultimate destination by the cheapest method, without intermediate stoppage, although such system or method may prevent some locality or localities or the citizens thereof from reaping an advantage which they might otherwise have."

The middlemen seem to be having a hard time of it all around. In Chicago the butter men complain of through rates that enable that solid commodity to fly right over their heads. Dissatisfied grain men are as numerous there as anywhere else, though the general hubbub partially drowns their cry. St. Louis, Philadelphia and other cities speak up whenever they can get a hearing. Meantime competition compels every buyer to go more and more directly to the cornfield for his corn, and the heartless locomotive finds it just as easy to haul cars by way of Lonelyville Junction as through a great metropolis where grain elevators try to block its path—easier, in fact. And Chicago capitalists build new belt railroads to take freight around that city, just as coolly as though there were no butter merchants or grain dealers in sight.

The newspapers of New York City, and the correspondents sending daily telegraphic letters to cities all over the country, are making "news" of an item to the effect that "Officials of the Produce Exchange denounce as arbitrary and unjust a ruling of the Joint Traffic Association that provides, in the case of carload lots, that no delivery of freight shall be made until a receipt has been signed by the consignee for all the merchandise in a car. The rule was put into operation by the New York Central & Hudson River Railroad. It was aimed at joint shipments in single car lots." What an astounding variety of irregular practices those Joint Traffic Managers are bringing to the light! That Board will be as valuable to the railroad interests of the country as the Civil Service Boards are in the political field. And every straightening-out arouses a complaint of injustice from dignified merchants, or other eminently respectable people, who seem to think that railroad tariffs were made only to be ignored. This, of course, is not so very strange, as railroad men have taught them this notion; but the merchants would probably be compelled to laugh at their own pettiness if they could see how the matter looks to outsiders and to railroad men who do not believe in shading rates so constantly that shading comes to be the freight agent's second nature. Technically, it looks as though the New York Central had perpetrated a slight "injustice" in demanding a *receipt* before permitting a car to be unloaded, when really all that it can reasonably ask for is an agreement, from the ostensible consignee, to sign for all of the goods, that is, for all of the wagon loads, when he shall have seen the whole. It does not look reasonable for a teamster to receipt for 200 barrels of flour before he has had a chance to count them. On the other hand, however, the railroad can fairly complain at the unreasonableness of the consignee who takes half of a carload, and then says that he doesn't care what becomes of the other half. But that is not the point that troubles the Produce Exchange men, of course. What they want is the carload rate on half-carload lots. Of course they should not have it, because hundreds of other merchants are paying full rates and would be discriminated against. If two or more shippers or consignees club together, without infringing the regulations, the railroad cannot help itself, and shippers of small lots who cannot combine must put up with it. If much of this were done it would show that possibly the difference between corload and less-than-carload rates ought to be made smaller.

The advocates of the new company formed to engage in canal-boat transportation on a large scale, come pretty near contradicting themselves. They say that the establishment of a powerful company, with large storage capacity at terminals, was necessary to insure the carriage of flour from Minneapolis to New York at fair rates, because the Joint Traffic Association had brought about the abolition of reduced rates which were formerly given on flour for export; but in the next breath admit that rates by rail have fallen to a reasonable level by their own weight. Still the new company is going ahead with its plans, so as to guard against the possible total annihilation of the shippers' profit "by the action of half-a-dozen Joint Traffic Managers." The falling of rates "by their own weight" etc., means, of course, that sharp competition has brought them down to pretty near cost, which is true. If the actual cost of the very liberal free storage given by the railroads at New York could be known, we might find that the service was being performed at less than cost. If the railroads want the freight as badly as this, it does not look much as though they would do anything to annihilate the miller's profit, and so drive him out of business. We think it more reasonable to explain the establishment of the new line by the simple fact that an enterprising promoter sees a possible opportunity to profitably improve the facilities of canal-boating by combining enough boats in one company to warrant the establishment of large terminals at New York, where flour can be cheaply stored long enough to neutralize the difficulties due to the inability of boats and ocean vessels to make close connection one with the other. With careful management, the new company ought to get a share of the business, especially if the flour millers are part owners in the line. And yet one of the chief difficulties still remains, that of transferring the flour from the lake vessel to the canal-boat. We do not understand that the new company proposes to try to run the same boat through from Duluth to New York. The only advantage over other canal-boats is in the better terminals and the larger capital, and the only advantage over the railroads, cheapness (which is partially neutralized by slowness), is a very narrow one. In 1895 the railroads carried grain from Buffalo to New York at considerably less than three cents a bushel, and at rates which, it was said, the canal-boats could not meet. Whatever advantage the railroads possess as regards grain, ought to hold equally good with flour, if not better. There is a law in New York limiting the capital of canal-boat companies to $50,000 each. The promoters of the new concern say that this law was "sneaked through" by the railroad interest last year, and they ask to have it repealed.

The Nicaragua Canal Again.

The obstinate opposition made by the officers of the Nicaragua Canal Company to every proposition to have more complete surveys and studies made before the nation should become responsible for the money to carry on the work, has long been something of a mystery. It is hard to see why a course should be taken which was obviously delaying the settlement of the question, if the canal company really felt as secure in its position as it pretended to feel. The most extraordinary reason for haste which has been brought forward is that given by Mr. Miller, of which we spoke last week. He urged that a waiting world should be relieved from doubt; that capitalists at home and abroad feared to put their money into the project lest the United States government should guarantee the bonds and thus relieve the investors, not only of risk, but of the chance for speculative profit. We suppose that even school boys saw through the flimsiness of this argument.

Now it becomes evident that the company had a vital reason for wishing to have the United States government committed to the enterprise. It appears that the company no longer has any standing in Nicaragua, and naturally it would wish to unload a forfeited concession upon the United States government, and leave that government under the necessity of using the "resources of civilization" against little Nicaragua or lose its investment. January 15, Senor Rodriguez, the Minister of the Greater Republic of Central America, sent to the Secretary of State a letter which was made public last week. In this he says that under instruction from his government he has examined five bills now before Congress. He finds that all these bills take it for granted that the government of the United States is to take an important part in the enterprise and to furnish the money for construction. He finds that the provisions of these bills are at variance with the stipulations of the contract of April 24, 1887, between Nicaragua and the company, from which contract the company derives its existence. One stipulation is that the concession shall not be transferred to governments or to foreign public powers under penalty of forfeiture of the contract, but the bills effect a full transfer to the government of the United States. The company, under this contract, agrees to construct the canal within three years, reckoned from the beginning of work. That term expired a long time ago, and the company has made no pretense of meeting the obligation. Half a dozen other particulars are set forth in which the provisions of the bills contravene the contract between the Nicaraguan government and the canal company.

The Minister adds that it is evident that the company is unable to raise money to fulfill its contract unless the government of the United States furnish it therewith; but the contract by its terms excludes that possibility. Therefore the Minister proposes to our Secretary of State that the two governments shall come to a direct understanding on the subject and endeavor to reach a just arrangement with the Maritime Canal Company, so that it may renounce a concession whose conditions it is unable to fulfill.

The presentation of this letter before the Senate made a tempest in the bosoms of two or three of the more excitable Senators, who now go about saying that England is at the bottom of it; that England wants to get hold of the canal for herself, and that we must disregard law, morals, engineering experience and common sense in order to prevent this terrible calamity. We cannot imagine that any reasonable man can be deluded for a moment by this cry. For years the concession and the property of the company, such as it was have been hawked in the markets of the world; investors of every nationality have had an opportunity to buy the property and equity of the company. If they have not done so before, they are not likely to do so within the next two or three years, and there is no evidence that Great Britain hopes or is planning to control the Nicaragua Canal. Her education in international relations has advanced beyond that adolescent stage. She knows that the only living status for such a waterway, in a world of civilized nations, is the guarantee of its neutrality by all the great powers. This is the status of the Suez Canal which under the convention of Constantinople of 1887 is declared forever free and open, in war and in peace, to the merchantmen or the men-of-war of all nations. Neither it nor its approaches, to the distance of three marine miles, shall ever be blockaded. It shall ever be inviolable; no act of war shall take place upon it, though belligerent ships may be using it, and an interval of 24 hours shall elapse between the departures of hostile ships from either terminal. No troops or material of war shall be landed along it; no ships of a belligerent shall be stationed in its ports; no permanent fortifications are permitted, and no contracting power has special territorial or commercial advantages in it. These stipulations have been agreed to by all of the great European powers, except Russia, and by most, perhaps all, of the little ones. The ownership of canal shares by the British government gives it no additional political rights in the canal. Only an unscrupulous or ignorant "statesman" will stand up in the face of the world and say that Great Britain, with

her vast experience in world-wide war, trade and politics, seeks the control of the Nicaraugua Canal.

The fact is that the outcry about foreign control is all nonsense. If the canal is ever built it will have to court the shipping of the world in order to get business enough to pay the working costs and interest. The neutrality of the canal also will have to be guaranteed by some agreement of the powers. Where the ownership or control rests, therefore, makes absolutely no difference in time of peace. In time of war, the control will rest with the power that gets there first and with the strongest ships and prepared to fight the rest of the world.

How to Get Good Inspection.

We printed last week a paper by Mr. Waitt, which was designed to call the attention of the Western Railway Club to the matter of preparing specifications for new rolling stock and to the method of inspection rolling stock while building. This paper was discussed at length at the January meeting of the club and the discussion showed (as has been apparent for a good while), that the notion that the most efficient inspection can be got by using the services of a competent and reliable inspection bureau is growing among mechanical officers and purchasing agents. This is a pretty important question and one to be carefully considered before a conclusion can be reached and perhaps a *general* solution is not possible as conditions differ.

Some roads provide more or less elaborate departments of inspection and testing under the management of an engineer, who has under him such assistants as the work requires, or rather such assistants as the management allows him. As a rule this department is considered an expense to be kept as small as possible and a few assistants are expected to cover a wide range and be experts in all the varied materials used by the road. To be competent to pass on the quality of every kind of supply is beyond the ability of ordinary men, especially if, as is usually the case with these men, they have had but a few years', or perhaps months', experience. If a road is so large as to have constant employment for a complete corps of inspectors and can afford to employ men trained for each of the different classes of work required, this system may be admirable and it may be most valuable in the economical working and maintenance of the road.

On the other hand are those roads where it is impossible to keep up an elaborate department of inspection and testing because the expense of this department would be out of all proportion to their earnings. These roads are far the most numerous; in fact they include most of the railroads of the country. Such roads must either do without inspection or else provide very inadequate inspection by sending some of their employees from the road or the shops to inspect the larger purchases made, in such manner as limited time and inadequate means allow. Or they may employ the services of an inspection bureau with whose employees they have no acquaintance and of whom they have no means of knowing whether they are competent or not.

The inspecting bureaus have done much excellent work, and a great deal of the present excellence and uniformity of material as furnished by the steel mills is due to their skill and fidelity; but the system is not perfect, for it is not very unusual to find some of these firms offering their services at charges so low that it is evident on the face that only a superficial examination of material can be made by inspectors commanding no more than boys' pay. As such service is of a purely professional character it should be well understood that it is not subject to competition and bidding.

The project has often been discussed, and indeed it has been sometimes tried, of an inspection bureau composed of experts in each line it essays to work in. The theory is that the names and qualifications of these experts should be the basis of soliciting business and not the price at which a ton of material will be inspected. Such a bureau should have at its head an engineer of recognized ability, and associated with him several experts who would each have charge of a certain class of work. Under these experts would be the corps of inspectors, and the names of these inspectors should be known, as well as their qualifications for the work they are to perform. When a railroad placed work in the hands of such a bureau it should be required that the bureau state clearly who the inspector or inspectors would be and how much and what sort of service they would perform. It would then appear just what the road was paying for and so the services rendered would bear a direct relation to the expense incurred, and the road could feel assured that their inspection was in the hands of reliable inspectors.

Some of the best inspectors to be had are young men of limited experience, provided these men are under the direction and instruction of older and more experienced men. While it is true that competent experts command good salaries, it is equally true that very few of the men now engaged as inspectors are paid more than $75 a month, and many of them receive less than $50, even though left quite to themselves without guidance or instruction further than the wording of the specifications placed in their hands.

December Accidents.

Our record of train accidents in December, given in this number, includes 29 collisions, 60 derailments and 6 other accidents, a total of 95 accidents, in which 62 persons were killed and 90 injured. The detailed list, printed on another page, contains accounts only of the more important of these accidents. All which caused no deaths or injuries to persons are omitted, except where the circumstances of the accident, as reported, make it of special interest.

These accidents are classified as follows:

COLLISIONS.	Rear.	Butting.	Crossing and other.	Total.
Trains breaking in two	4	0	0	4
Misplaced switch	2	1	0	3
Failure to give or observe signal	1	0	0	1
Mistake in giving or understanding orders	0	2	0	2
Miscellaneous	3	1	5	9
Unexplained	3	3	4	10
Total	13	7	9	29

DERAILMENTS.			
Broken rail	2	Bad loading	1
Loose or spread rail	1	Animals on track	1
Defective switch	1	Landslide	3
Broken wheel	2	Snow	1
Broken axle	5	Malicious obstruction	4
Broken truck	4	Maliciously misplaced switch	2
Failure of coupling	1	Accidental obstruction	1
Boiler explosion	1	Unexplained	24
Misplaced switch	3		60
Track repairers	1		
Unfastened draw	1		
Failure of signal	1		

OTHER ACCIDENTS.	
Boiler explosion	2
Broken side rod	1
Cars burned while running	1
Other causes	2–6
Total number of accidents	95

A general classification shows:

	Collisions.	Derailments.	Other accid's.	Total.	P. c.
Defects of road	0	4	0	4	4
Defects of equipment	4	13	4	21	22
Negligence in operating	15	7	1	23	24
Unforeseen obstructions	0	12	1	13	14
Unexplained	10	24	0	34	36
Total	29	60	6	95	100

The number of trains involved is as follows:

	Collisions.	Derailments.	Other accid's.	Total.
Passenger	6	17	3	26
Freight and other	43	44	3	90
Total	49	61	6	116

The casualties may be divided as follows:

	Collisions.	Derailments.	Other accid's.	Total.
Killed:				
Employees	15	26	2	43
Passengers	0	17	0	17
Others	1	1	0	2
Total	16	44	2	62
Injured:				
Employees	10	39	4	53
Passengers	11	23	0	34
Others	1	2	0	3
Total	22	64	4	90

The casualties to passengers and employees, when divided according to classes of causes, appear as follows:

	Pass. Killed.	Pass. Injured.	Emp. Killed.	Emp. Injured
Defects of road	0	10	0	2
Defects of equipment	0	0	8	8
Negligence in operating	0	11	15	10
Unforeseen obstructions and maliciousness	17	13	14	15
Unexplained	0	0	6	18
Total	17	34	43	53

Twenty-seven accidents caused the death of one or more persons each, and 16 caused injury but not death, leaving 52 (55 per cent. of the whole) which caused no personal injury deemed worthy of record.

The comparison with December of the previous five years shows:

	1896.	1895.	1894.	1893.	1892.	1891.
Collisions	29	72	63	84	107	125
Derailments	60	79	69	77	95	101
Other accidents	6	6	7	5	10	8
Total accidents	95	157	142	166	212	234
Employees killed	43	41	24	24	37	62
Others killed	19	7	5	7	4	23
Employees injured	53	84	58	89	110	172
Others injured	37	115	32	120	119	159
Passenger trains involved	26	56	58	64	84	72
Average per day:						
Accidents	3.06	5.06	4.58	5.36	6.84	7.55
Killed	2.00	1.55	0.94	1.00	1.32	2.74
Injured	2.90	6.42	2.90	6.74	7.39	10.68
Average per accident:						
Killed	0.65	0.31	0.20	0.18	0.19	0.36
Injured	0.95	1.27	0.63	1.25	1.08	0.41

Of the accidents to passenger trains in Deeember only three were notable; these were the disaster at Gurnee, Ala., on the 27th; the butting collision at Sedamsville, O., on the 7th, and the derailment, followed by fire, at Cameo, Col., on the 13th. The Gurnee disaster is being investigated by the Alabama State Railroad Commissioners. Since the first few days after the wreck, or since the Commissioners took up the investigation, little or nothing has been said about the accident in the newspapers, and no authentic detailed account of the alleged evidence of malicious disturbance of the track has yet been published.

There were 10 electric street-car accidents in Decem ber, in which one person was killed and 18 were injured. There were four collisions and four cases of street cars running into locomotives, or vice versa. The other two accidents were derailments.

Lines to Galveston.

Several new combinations are reported in connections with the increased deep-water facilities at Galveston. Some of these projects are only on paper, but they are of interest as showing the tendency of business in that direction.

The Burlington and the Missouri, Kansas & Tex a roads have recently entered into a traffic contract which provides for the transfer of export grain from the for mer to the latter at Hannibal, Mo., and an interchange of northbound business as well. The Burlington last year was handicapped because it had no direct connection to the Gulf and in consequence was obliged to see considerable export grain diverted from its lines. President Rouse of the Missouri, Kansas & Texas, in his last annual report, referring to the perfection of his arrangements for an entrance to Galveston, says: "This terminal connection, effected coincidently with the development of Galveston as a deep-sea harbor, has already exercised an important influence in changing the direction of the movement of the export trade in cereals produced in the regions west of the Missouri River. It seems certain that there will be a constantly increasing volume of export traffic to this Gulf port."

The Atchison, Topeka & Santa Fe has a well-established line to Galveston, over which it transports export grain from its numerous Kansas points; one of its Kansas lines runs from Superior, Neb., almost directly south to a connection with its Texas line, thus giving it a short route to Galveston for Nebraska corn received at Superior from the Fremont, Elkhorn & Missouri Valley road.

President E. H. R. Green, of the Texas Midland, is reported as trying to form a new through line from St. Louis to Galveston. To do this he proposes to acquire the Galveston, La Porte & Houston, now in the hands of receivers, and then either make a trackage arrangement with the Houston & Texas Central or build from the southern terminus of the Texas Midland to Houston. The Midland connects with the St. Louis & San Francisco at Paris, Tex., and with the Houston & Texas Central at Ennis. The distance by the proposed line between Paris and Galveston would be 57 miles shorter than by the Gulf, Colorado & Santa Fe. The Greens are supposed to be abundantly able to build several railroads if they choose to do so, and it is said that young Mr. Green has political aspirations which would undoubtedly be furthered should he become "a leading railway magnate." But whether he will choose to build 200 miles of railroad remains to be seen.

Another scheme is the improving of Pelican Island in Galveston harbor. Articles of incorporation were taken out this month at Galveston for the "Galveston Terminal Company," and the Galveston *Tribune*, in a recent article, professes to have discovered that the Southern Pacific Company is interested in the new corporation. Well-informed railroad men, however, look upon this project as visionary, for the reason that it would not only require the expenditure of a large sum of money on the island, but involve, as well, the construction of an expensive bridge to connect the island with the main land. Besides, the present facilities are ample for all the requirements of traffic, and the addition of another elevator, now in process of construction by the Wharf Company, will provide facilities for all probable requirements for some time to come. It is not unlikely that the Southern Pacific may in time go to Galveston, but it is more likely to do it by making use of existing terminals.

The recent attempt to establish a regular line of passenger steamers from Europe to Galveston did not meet with sufficient support to warrant its continuance, but the steamship companies state that they will continue to provide a sufficient number of boats to take care of all the traffic, both freight and passenger, and whenever business warrants will establish regular sailings.

A compilation of statistics from the reports and data of the various trade associations reveals the fact that for the calendar year 1896 Galveston secured about 5 per cent. of all the export corn and wheat, being about equal to the amount passing through Newport News; New Orleans handled 17 per cent., these three ports thus taking a total of 27 per cent. of all the export grain as against 23 per cent. moved through New York. Compared with 1895, New Orleans shows an increase of about 7 per cent., Newport News a slight decrease, and New York a decrease of about 21 per cent. The significant point in these figures is that the business at Galveston in 1896 was practically all new, this being the first year in the history of that port when it could be rightly called a competitor in the export trade; and that the traffic through that port the first year was about equal to that of Newport News and one-third that of New Orleans.

Grain Exports in 1896.

The government figures of exports of breadstuffs during the past pear are of especial interest because of the

exceptionally heavy movement of grain, and particularly of corn, which we have had this year. We summarize herewith the exports of wheat, corn and oats from the principal Atlantic and Gulf ports and of the totals shown in the table we give the percentage going through each of the ports.

GRAIN EXPORTS FOR THE TWELVE MONTHS TO DEC. 31.

	Corn.		Wheat.		Oats.		Total.			
	1896.	1895.	1896.	1895.	1896.	1895.	1896.	P. c.	1895.	P. c.
Baltimore	26,382	9,646	6,590	3,967	6,920	124	39,892	20.8	13,747	15.2
Boston	5,893	5,320	9,839	4,810	1,920	2	17,652	09.4	10,132	11.1
Newport News	10,377	4,866	.....	1,185	3,750	105	14,127	07.4	6,156	06 7
New York	19,100	19,626	18,476	20 339	15,880	1,364	53,456	27.9	41,329	45.5
Norfolk	12,891	3,545	17	166	74	1	12,982	06.7	3,712	04 1
Philadelphia	8,829	3,307	4,864	1,537	439	59	14,132	07 4	4,903	05.4
Galveston	6,222	1,233	3,439	.....	.....	.....	9,661	05.0	1,233	01.4
New Orleans	25,292	8,757	3,853	836	262	24	29,407	15.4	9,617	10.6
Total	114,986	56,300	47.078	32,840	29,245	1,689	191,309	100	90,829	100

It will be seen that our exports of these three cereals more than doubled, the increase in the year, which is the calendar year, being 110 per cent. Much the largest share of this increase is accounted for by the large corn exports, nearly 59 million bushels more than in 1895 from the ports shown, and over 67 million more from all ports in the United States. Wheat exports also increased largely, the increase in the year being from the ports named, 43.3 per cent. more than in 1895. Exports of oats increased 1631.5 per cent., so that each of the three crops has furnished a large traffic.

New York maintains its pre-eminence by a lead of 14 millions over Baltimore, now the second port of export for breadstuffs, but its claim of exporting more than half of the principal grains of the country has been sadly reduced, and it can now claim but a little more than a fourth of the three most important grains, whatever its position may be in the total export movement of the country.

Moreover, the port has only been able to maintain its lead by a great increase in the least important of the three grains for which figures are given. There is not only a relative but an actual decrease in the exports of both corn and wheat. New York is the only port reporting decreases in these two leading grains. Boston gained but little over ½ million bushels in corn, Norfolk and Newport News lost in wheat, but they more than retrieved these losses in higher exports of corn. But New York has a loss of 2,389 thousands of bushels in corn and wheat.

The decrease in percentage of grain exported out of New York began in July, and the low railroad rate on export corn, which went into effect in that month and remained in force until November, did not succeed in bringing up its position.

In connection with the percentages given in the large table of the movement through each port for the year, the following table of percentages, showing the proportion exported by each port in the eight months to Aug. 31, is of interest:

	1896.	1895.
Baltimore	20	17
Boston	10	13
New York	34	36
Philadelphia	7	8
New Orleans	16	7
Other ports	13	9

The changes since have not been very great. New York's percentage has fallen from 34 per cent. to 28.9 per cent., while Galveston, Newport News and Norfolk, taken together, have increased their exports from 13 percent. to 18 per cent.

The great advance made by the Southern ports early in the season was well maintained down to the close of the year. The actual figures vary from about eight million bushels increase reported by Newport News to 26 million bushels increase by Baltimore. New Orleans increased her exports nearly 20 million bushels. The three Southern Atlantic ports increased their exports over 33.2 million bushels and the two Gulf ports increased their exports nearly 28 million bushels. These figures are each considerably greater than the total exports of corn or grain out of New York, and not very far from its total combined wheat and corn exports.

The percentages of increase in exports in 1896 over 1895 via the various ports were:

Boston	76 per cent.
New York	29 "
Philadelphia	18 "
Baltimore	190 "
Norfolk	250 "
Newport News	129 "
New Orleans	205 "
Galveston	683 "

The exports of wheat from New Orleans and Galveston are worth noting. The latter port had exported only 331 thousands of bushels up to Aug. 31, all but 20 thousand of which had gone out in that month.

About the average number of bushels of railroad legislation has been proposed since our last issue, but to the reader who is looking for variety we are obliged to present a disappointing statement, as the bills introduced have been nearly all on two subjects, railroad commissions and rate reductions. Commissions are proposed in Arkansas, Colorado, New Jersey, South Dakota, Tennessee and Washington. Propositions to reduce passenger fares have been offered in North Carolina, Iowa, Connecticut, Texas, and probably in every other state where a legislature is sitting. Such propositions come up so regularly that some of the reporters deem it hardly necessary to mention them. In North Carolina the legislators always amuse themselves by including telegraph companies with the railroads, and they have not forgotten to do so this year, the bill making passenger fares 2 cents a mile providing also that telegrams must be sent for 15 cents. In Connecticut the proposer of the bill, Mr. Neary, seems to be quite Near, in spirit, if not physically, to the distinguished author of that state, Mr. Cowles, who has recently written a book to show that freight can be carried 1,000 miles at the same price as for 10 miles; for Mr. Neary proposes that freight shall be carried at 6 cents per 100 lbs. and passengers at 1 cent a mile, for any distance within the state. To popularize his bill he includes bicycles at 5 cents each and milk at half a cent a quart. Why he does not provide for free seats in the drawing-room car for all the country editors and their wives and marriageable daughters, and for base-ball coupons to be attached to all Saturday excursion tickets, are mysteries which cannot be explained until the legislature orders a hearing on the bill. In Missouri there is a bill requiring separate passenger cars for negroes, and in South Carolina one requiring bicycles to be carried free in baggage cars. One of the arguments in favor of this last bill is that most of the highways in that state are "dirt roads," and that consequently bicyclists will never get very far away from home. There is a similar bill in Kansas, but they are too proud out there to say anything about dirt roads. In Congress an amendment is proposed to the third section of the Interstate Commerec law compelling railroads to interchange freight and make through rates, as was desired by the Little Rock & Memphis road in the well-known case which has been discussed by the Intestate Commerce Commission and the United States courts. There is also a bill in Congress making train robbery punishable with death. The member presenting this bill, Mr. Hubbard, of Missouri, stated that in a period of six years 183 railroad trains had been "held up" by robbers and that, in these 183 cases, 73 persons had been killed and 58 wounded. During the single year 1896 he counts up 23 "hold-ups," 32 passengers and trainmen and four robbers killed and seven passengers and two robbers injured.

Under date of Jan. 8, the Midvale Steel Company sent to the House Committee of Ways and Means, a letter protesting against any change in the present tariff relating to "the manufacture of metals and to the materials, either raw or in a partly made state, which are used in the manufacture of metals." The argument is that the committee must have in view two objects. First, to get revenue; second, to lighten the burden of the cost of living. But any increase in the rate of duty on imports would diminish revenue by shutting off or diminishing the quantity of imports; and, on the other hand, it would increase the cost of the article to the consumer. The objects therefore that the committee seeks to attain would be defeated by any change in the direction of an increase in rates, but would be promptly and efficaciously reached by diminishing the existing duties. The company says that the price of tires has not been affected in the slightest manner by the difference between the Wilson tariff and the McKinley tariff. Under the McKinley tariff the schedule was 2½ cents per pound and the base price of tires was 4 cents a pound; and to-day that price is still 4 cents per pound and the schedule is 1¼ cents. In steel castings the present duty is more than sufficient to protect this branch of industry. Such castings are sold in England at between 30 and 50 per cent. higher than the prices in this country. The Midvale Company is earnestly engaged in increasing its trade abroad, and it fears the result from that effort of any increase of duty in the metal schedules.

In our issue of Jan. 8, we published some figures which had been compiled by the New York News Bureau, giving the amount of railroad bonds bearing high interest rates maturing between 1897 and 1900. The same authority has compiled a supplemental table, covering the period between 1901 and 1905, both years inclusive. In these five years it finds that a total of $258,098.500 of railroad bonds bearing five, six and seven per cent. interest become due. The interest charges on the bonds at the present rates call for an annual payment of $15,890,000. If the railroads can effect the refunding of all these bonds at an uniform rate of four per cent., the resulting saving in annual fixed charges is $5,566,735. The aggregate of bonds falling due in the years including 1897 and 1900 is given as $208,832,500 (which corrects the earlier figures). It is necessary to provide $13,607,000 a year, to fully pay the interest on these bonds at the existing rates of interest. The saving by refunding at four per cent. would be $5,254,000. The totals, then, for the nine years for which the figures are given, may be summarized as below:

Aggregate of high rate bonds falling due	$466,931,000
Present interest charges	29,498,078
Interest at 4 per cent	18,677,240
Annual saving in interest	$10,820,838

The question of classes on English passenger trains is by no means settled, although there is doubtless a considerable majority of opinion in favor of only first and third classes for long distances. Nevertheless, Sir Charles Scotter, General Manager of the London & South Western, says that his experience warrants the conclusion that there are still in England three classes of railroad travelers and he believes that the remedy for the decline of second-class traffic is to be found in bringing second-class rates nearer to those for third class. On his road third-class fares up to the beginning of last May averaged about two cents a mile, second class about three cents and first class four cents. On that date, the second-class fare was reduced 25 per cent. over the whole system and in the following seven months there was an increase of nearly 98,000 ordinary second-class passengers and there was an increase in receipts from second-class tickets of nearly $80,000. During the same period there was a large increase in the number of first-class passengers. The Midland Railway abolished second-class carriages about 21 years ago and the Scottish companies soon followed the example, and to-day no second-class carriages are to be found north of the Tweed. In England, however, nearly all systems still have second-class accommodation.

Press dispatches from the West state that several of the members of the Western Freight Association are dissatisfied with the percentages allotted to them under the new agreement and that a meeting will shortly be held at which members will present to the Board of Administration their reasons for desiring changes in the authorized percentages. Some of the Western correspondents profess to see in this the beginning of serious disturbances in that association, but we are advised by prominent officials who are in a position to know that there is no probability whatever that the agreement will be weakened by any readjustment which may be attempted. As is well known to all conversant with the Western situation, it is much more difficult to prescribe any basis of percentages for the equitable distribution of traffic in that territory than it is in the Trunk Line and Central Traffic territory, for the reason that there are so many conflicting and continually changing factors entering into the problem. Further, it was known at the time the new association was formed that the percentages then agreed upon were to be subject to revision after they had been in effect long enough to find out how they would work out in practice.

The Portland *Oregonian* calls attention to the fact that the British bark Midas lately sailed from that port for England laden with 2,400 tons of freight, presumably grain, which was carried at 20 shillings a ton; a rate, which, estimating the distance at 16,000 miles, is equal to three-tenths of a mill per ton per mile. Unfortunately, the number of hundredths of ounces of coal consumed per ton per mile cannot be computed for a sailing vessel, though the average wind pressure per square inch of sail-surface might, we should think, be made the subject of an interesting speculation. We trust that the Populists in the Oregon and Washington legislatures will not see this item; they would at once introduce bills to have the freight tariffs of all the railroads changed to the basis of .3 mill per ton per mile.

NEW PUBLICATIONS.

Spencer Trask & Co., bankers of 27 Pine street, New York City, have issued a small pamphlet of 56 pages, 5¼ × 3¼ in., giving considerable information regarding the securities of railroad and industrial companies. The first summary of statistics for steam railroad companies includes the mileage, capitalization, earnings, dividends and fixed charges with the range of prices of the stocks in 1896. The information is presented in condensed tabular form. The tables are comprehensive, and no important data within the range intended to be covered are omitted. In addition to the items noted above the gross and net earnings and fixed charges per mile of road have been figured out. The information has been for the most part taken from the annual reports of the different companies and other original and authoritative sources, and has involved considerable labor in compilation. A second table gives statistics of different issues of railroad bonds for many companies. It is also in tabular form and includes many more companies than the first table. It shows the rate of interest, the date of interest payments and maturity of the bonds, amount outstanding and mileage on which the issues are a lien, with the range of prices in 1896, the last quoted price and the approximate per cent. of income computed on the selling price. The statistics of industrial corporations, miscellaneous companies and of street railroad companies are not so full or complete, undoubtedly because of the impossibility of obtaining information in so complete a form as is possible for steam railroad securities.

Tribune Almanac. Published by the Tribune Association, New York. Henry E. Rhoades, Editor.
This well known handbook has been issued for 1897. It contains the usual full variety of miscellaneous informa-

tion found in such books, and is particularly valuable for its political information. A very full summary is given of the laws passed by Congress during the past year, and a good deal of space is devoted to information about the state governments of all the states. The Almanac, like the *Tribune*, persists in annoying the reader by using Roman numerals with TH affixed, the 54th Congress being called the LIVTH. This is a trifle worse than LIID.

TRADE CATALOGUES.

Machines for the Manufacture of Bicycles.—Made by the Pratt & Whitney Co., Hartford, Conn. We have recently received from the Pratt & Whitney Co. a special catalogue showing machines made for bicycle shops. As we have recently noted, the exhibition of these machines at the cycle show in London excited a great deal of attention, and, perhaps, some apprehension among the British makers of machine tools. The catalogue shows some seventeen different tools and attachments, all very ingenious.

Another little pamphlet issued by the company shows bicycle parts made in these machines.

The Howden System of Hot Draft.—The Dry Dock Engine Works, Detroit, Mich., sends its latest catalogue on this system as applied to marine boilers. It consists, briefly, of an engine and blower for supplying the draft. These are placed in any convenient place, preferably in the engine-room, in which case the warm air from the engine-room is forced through an air duct to a heater, where, by passing around vertical tubes, through which the escaping gases from the furnace flow, it is heated. The heated air is then led down through ducts around the breeching and delivered under and over the grates in sufficient quantities to get perfect combustion. The Howden system is not new, but a number of improvements, the result of experience gained during several years' practice, have recently been made. The system commends itself to marine practice for its economy in fuel, reduced size and weight of boilers for a given power, coolness in fire-holds, and simplicity. The catalogue elaborates upon these topics, together with several other claims for the system. A number of pages is devoted to the manner of the introduction of the Howden system on the Great Lakes, giving a description of the equipments, with various comments, data and testimonials. A list of the steamers fitted with the hot draft system throughout the world, aggregating 1,383,500 I. H. P., is incorporated in the sheet. So also are the instructions to engineers working the system. The Dry Dock Engine Works has purchased an exclusive license for the use of the Howden patents on the Great Lakes, and within the last two years the Union Iron Works, San Francisco, has purchased a similar license for the Pacific Coast.

TECHNICAL.

Manufacturing and Business.

The Chicago Pneumatic Tool Co. received an order from London, England, last week, for 40 of its "A" size hammers, to be shipped during the months of January, February, March and April.

The Bryan-Marsh Company, of New York, manufacturers of incandescent lamps, have opened offices at 1239-1240 Monadnock Block, Chicago, with Mr. J. M. Hill in charge as General Western Manager.

The Missouri, Kansas & Texas has recently purchased of the Rand Drill Company an air-compressor, with cylinders 14 in. × 22 in., and four "Little Giant" drills. These are to be used in the company's quarry, from which stone for ballast is taken.

The Kalso & Slocan road, in British Columbia, has ordered a new rotary snowplow.

The annual meeting of stockholders of the Pittsburg Tool Steel Co., with works near Greensburg, Pa., was held recently in Pittsburg. Directors were re-elected as follows: J. C. Jamison, J. W. Kirker, William Speed, D. P. Thomas and W. G. Henderson. The directors then elected the following officers: J. C. Jamison, President; William Speed, Vice-President and General Manager; J. W. Kirker, Treasurer, and D. P. Thomas, Secretary. It was decided to increase the capital of the company.

Mr. Walter C. Arthurs has been appointed Receiver of the Mount Vernon Car Mfg. Co., of Mount Vernon, Ill., on application of a stockholder. The Receiver will carry out existing contracts. The company has a capital stock of $200,000. It has on hand, according to the complainant, material worth $75,000, and has machinery and other property valued at $200,000. A statement filed showed assets of $315,307, and liabilities $186,051. The officers of the company are: President, D. O. Settlemier; Vice-President, George A. Evans; Secretary, Walter C. Arthurs.

Mr. C. A. Thompson, 615 North Fourth street, St. Louis, has been appointed the representative of the Standard Steel Works in St. Louis and the Southwestern Territory.

L. M. Rumsey, Charles Parsons and W. H. Thompson, of Memphis, acting as a committee of the holders of the first mortgage bonds of the Madison Car Works, which issue amounted to $500,000, have taken proceedings looking to a sale of the works at foreclosure. The Madison Car Works is a comparatively new plant of large capacity, having been built about 1891.

The Department of Railways and Canals at Ottawa, Ont., is calling for tenders for July delivery of 4,000 tons of rails for the Intercolonial road. One thousand tons of 50-lb. rails for the Prince Edward Island branch are to be delivered at Charlottetown and 3,000 tons of 67-lb. rails are to be delivered at Halifax.

At the recent annual meeting of stockholders of the Toledo Car Wheel & Foundry Co., the old board and officers were re-elected as follows: President, C. E. Milmine; Secretary and Treasurer, H. B. Milmine; Directors, the above named, with L. S. Baumgardner, A. A. Milmine and W. M. Bolles

The A. R. Whitney Co., manufacturers of iron and steel, at Morristown, N. J., has been incorporated, with a capital of $500,000. The incorporators are J. R. Midway, of Rutherford, N. J.; D. A. Frisbie and A. R. Whitney, Jr., of New York.

The main machine shop of Greenlee Bros. & Co., at Chicago, was destroyed by fire on the night of Jan. 24 last. The blacksmith shop, the foundry and the four-story pattern and warehouse building were all saved, and the company is in position to fill most orders which may be received. The machinery in the machine shop was lost, but will be replaced immediately with modern machine tools.

The Gold Car Heating Co., of New York City, received this week an order from England for steam heating apparatus for the equipment of about 500 passenger cars. The improved steam traps and straight-port couplers are called for.

Iron and Steel.

On Jan. 25 the Illinois Steel Co. closed down the top and bottom mill, the fishplate mill and the old and new plate mill at its Bay View Works, in Milwaukee, Wis. No reason is given for the shut-down, which has thrown 600 men out of employment.

The works of the North Branch Steel Co., at Danville, Pa., have resumed after a shut down of several months. A large order has been received which alone will keep the plant running on full time for two months.

The Ohio Steel Co., of Youngstown, O., will erect 10 open-hearth steel furnaces, each of 40 tons capacity, adjoining its present plant, to be ready for operation by the opening of spring.

The annual meeting of the stockholders of the Cambria Iron Co. was held Jan. 19, and the following directors were elected to serve for the ensuing year: Josiah M. Bacon, Robert F. Kennedy, Charles S. Price, David Reeves, Powell Stackhouse, Edward T. Stotesbury, John W. Townsend, John Lowber Welsh and R. Francis Wood. The annual report showed that the company had earned about nine per cent. on the capital stock of $8,000,000.

The steel and rail plant of the Illinois Steel Co., at South Chicago, was closed Jan. 19, and between 2,000 and 3,000 men thrown out of employment. President Gates said that they shut down for the purpose of changing the rolls.

The Carnegie Steel Co. has opened branch offices in London and Liverpool, England. Changes have been made in the organization of the company, by which C. M. Schwab is made a Vice-President and the head of the mechanical department; A. R. Peacock, Vice-President and Head Sales Agent; L. R. Childs, Vice-President and head of the financial department, as Treasurer. The changes were made at a meeting of the Board of Directors by suggestion of Mr. Carnegie.

New Stations and Shops.

The contract for the new passenger station of the Baltimore & Ohio at Baltimore, at the southern entrance to the Belt Line tunnel, has been let and work will commence immediately. The improvements will cost in the neighborhood of $100,090.

The contract for erecting the new passenger station and office building of the Gulf, Colorado & Santa Fe, at Galveston, Tex., has been let to the Texas Construction Co. of Fort Worth and Galveston, and work will commence as soon as the bonds are approved. The building is to be completed by July 20, and is to cost about $100,000.

The new union station of the Jacksonville Terminal Co., at Jacksonville, Fla., has just been completed. The building is of brick, with a cement cast covering, trimmed with red brick, and with a roof of terra-cotta tiling. It covers an area 365 × 120 ft. The waiting room is one-story high, with a floor area of 12,000 sq. ft. The contract for the building was let to S. S. Leonard in June, 1896.

The new station of the Lake Shore & Michigan Southern, at Wauseon, O., under construction for nearly six months, has been completed. It is built after the Japanese style of architecture, and of brick and stone, and cost about $12,000.

Work has been begun on the new blacksmith shops of the Missouri, Kansas & Texas at Denison, Tex.

The many newspaper statements regarding the rebuilding of the shops of the Cincinnati, Hamilton & Dayton at Lima, O., are, for the most part, unfounded. The question of rebuilding the shops at Lima is by no means determined upon and no plans for shops have been considered. The company's officers have made a proposition to the citizens of Lima which is now under consideration, but nothing will be done in the matter until that proposition has been declined or accepted.

The Ann Arbor and the Detroit, Grand Rapids & Western have under consideration plans for building a new joint station at Alma, Mich., which will involve certain changes of line at that point. The plans, however, have not yet been formally approved.

A brick freight-house 142 × 656 ft. has just been completed by the Western & Atlantic and the Seaboard Air Line roads in Atlanta. The building has a metal roof and a concrete floor. It cost about $100,000.

The Southern Railway has definitely decided to erect a new freight and passenger station at Rock Hill, S. C.

The Atlanta, Knoxville & Northern proposes the erection of machine shops in Elizabeth, Ga., at a cost of $15,000, provided inducements are offered from the citizens of that place.

The Norfolk & Western will build an extensive repair plant at Kenova, W. Va., in the spring. The foundations were built some time ago, but operations have been delayed.

The Chesapeake & Ohio has advertised for bids for a new freight house and office on Second avenue, Huntington, W. Va. The plans call for a brick building.

The Baldwin Locomotive Works have awarded Roydhouse & Arey, of Philadelphia, the contract for a boiler and brass shop, which is to be erected at Fifteenth and Buttonwood streets, Philadelphia. This building will be built of brick, one story high, with a slag roof. It will measure 197 ft. × 150 ft.

The two large buildings of the Georgia Car & Manufacturing Co., in Savannah, Ga., are rapidly nearing completion, and within two months the machinery will be ready for operations. The two buildings stand 200 ft. apart, and each is 1,200 ft. long and 106 ft. wide.

Both the Charleston & Savannah and the Florida Central & Peninsular Railroads have put in sidetracks.

The Pennsylvania has accepted plans and specifications for a new station at East Liberty, Pa., and it is expected that work will be begun in the spring.

Pig Iron Production in 1896.

Statistics of pig iron production in the United States during 1896 have been collected by the American Iron & Steel Association, and recently published in the *Bulletin* of the Association. Complete returns from the different manufacturers show that the total pig iron production for the year was 8,623,127 gross tons, which is 823,181 tons less than in 1895. The production by half years from 1893 to 1896 has been as follows, in gross tons:

Periods	1896.	1895.	1894.	1893.
First half	4,976,236	4,087,558	2,717,983	4,562,918
Second half	3,646,891	5,358,750	3,939,405	2,561,584
Total	8,623,127	9,446,308	6,657,388	7,124,502

Of this total, 8,623,127 gross tons in 1896, Pennsylvania produced 4,024,166 tons. The other states producing over 100,000 tons each are: Ohio, 1,196,326 tons; Illinois, 925,239 tons; Alabama, 922,170 tons; Virginia, 386,277 tons; Tennessee, 248,338 tons; New York, 206,075 tons; Wisconsin, 158,484 tons; Michigan, 149,511 tons, and West Virginia, 108,569 tons. The production of Bessemer pig was 4,654,955 gross tons against 5,623,695 tons in 1895. Of this total for the past year Pennsylvania furnished 2,796,884 tons; Illinois, 807,511 tons, and Ohio, 799,061 tons. Alabama, which ranks fourth in the total production of pig iron, furnished no Bessemer pig. The large amount of Bessemer pig produced in 1895 was caused chiefly by the extraordinary demand for structural steel in that year, but during 1896 there was a large falling off in the demand for both structural steel and steel rails. The total production of basic pig was 336,403 gross tons, distributed as follows: New England, New York and New Jersey, 22,692 tons; Allegheny County, Pennsylvania, 168,095 tons; other counties in Pennsylvania, 51,768 tons; Virginia and Alabama, 73,604 tons, and Ohio and Wisconsin, 20,244 tons. There were 310,244 gross tons of charcoal pig iron produced in 1896, an increase of 84,903 tons over the 1895 output. The total production of spiegeleisen and ferromanganese for the year was 131,940 tons.

The Gas Exposition.

On Wednesday evening of this week the Gas Exposition at Madison Square Garden was opened and will continue until Saturday, Feb. 6. For many weeks the Gas Industry Company, of which Prof. Charles F. Chandler is President and Mr. E. C. Brown is Managing Director, has been making active preparations for a successful event, and the results of their labors, up to the time we go to press, indicate that the exposition will be a creditable undertaking. Under the direction of Mr. Lewis Tiffany, a gas tower has been constructed which promises to be the central attraction. The tower is 60 ft. in height and is composed of eight sections, representing the periods in the development of gas as an illuminant. Each of these divisions rises one out of the other, diminishing in size as they ascend, and they are ornamented with arches and colored lights. On the exterior of the column there are 2,250 lights, while the interior is supplied with 688 lights, all arranged so as to form an artistic ornamentation.

More than 75 exhibitors have arranged to show their apparatus, among who are the following:

Bartlett, Hayward & Co., gas works machinery.
Fairbanks, Morse & Co.; gas engines.
Pennsylvania Iron Works Co., "Globe" gas engines.
Safety Car Heating & Lighting Co., Pintsch compressors, buoys lights and other apparatus.
Welsbach Street Lighting Co., Welsbach for street illumination.

Besides these, R. D. Wood & Co., the United Gas Im-

provement Co., B. F. Sturtevant Co., Mica Manufacturing Co., Joseph Dixon Crucible Co., and the Continental Iron Works will make an exhibit.

Polyphase Currents for Electric Railroads.

The *Elektrotechnische Zeitschrift* for 1896 contains an an article relating to the advantages and disadvantages of the polyphase currents for street railroads, and describes the polyphase electric road in Lugano, Switzerland. The chief disadvantage, compared with the direct current, appears to be that at least two overhead wires must be used in the pholyphase system. These, however, can be made reasonably light, and at crossings one wire only is needed, as the motor when once started will work as a single-phase machine. The chief advantages of the polyphase system of transmission are: (1.) The current at high potential can be produced at a distance and brought to convenient points on the line and there transformed to a lower potential, thus avoiding the necessity for using heavy mains. (2). The motors have no troublesome commutators and can develop more power relatively than direct current motors, since the latter have far more induction in the iron, and consequently their starting power is diminished. (3.) The speed of the motor can be varied from zero to that corresponding to synchronism with the current. The resistence is usually cut out altogether, and then the motor runs at a constant speed, even though the load may vary. This quality is taken advantage of in descending and ascending grades. In descending, the motor delivers current into the mains without any alteration of switches, and is therefore automatically retarded, so that its speed cannot exceed a known maximum.

The distance between Maroggia and Lugano is nearly 7½ miles and for several years the latter place has been supplied with electric lights on the alternate current system, the current being carried from Maroggia. The present installation consists in part of a 300-H. P. high-pressure horizontal shaft-turbine connected to a 150-H. P. three-phase generator, which develops 5,000 volts with a frequency of 40 periods per second running at 600 revolutions a minute. The electric pressure is reduced to 400 volts at a transformer station in Lugano. Contrary to the usual arrangements, the rotating pole shoes of the generator are not opposite each other, the poles on the one side being opposite to the openings at the other.

The total length of the line is 15,050 ft. and the two overhead wires are each .236 of an inch in diameter. The rail joints are copper-bonded and no separate return wire is used. At the present time four cars only are in use, each supplied with a 20-H. P. motor, connected to the axle by means of spur gearing. The average speed attained is 9.3 miles per hour.

THE SCRAP HEAP.

Notes.

Brown's discipline has been adopted on the Long Island road.

The private car of a prominent Western General Manager traveled during the year 1896 a distance of 54,419 miles. The figures are given to a reporter by the custodian of the car. The same informant says that in 1894 this car traveled 60,311 miles.

The number of applications presented to the English Light Railway Commissioners for authority to build light railways in England up to Jan. 1 was 15, in Wales 3 and in Scotland 8, a total of 26. The longest proposed line is one from Grimsby to Saltfleetby, 26 miles. The Commissioners will receive no more applications until May 1.

In Atlanta, Ga., petitions are being circulated among railroad employees asking the State Railroad Commissioners to rescind their recent action ordering a reduction in the freight rate on fertilizers. In Missouri the Brotherhood of Trainmen has sent to the legislature a remonstrance against the proposed law reducing transportation rates on railroads.

The Burlington car shops in Plattsmouth, Neb., were totally destroyed by fire on Monday night last. A fireman was overcome by the intense heat and perished. Loss estimated at over $125,000. The newly-erected freight-house of the Cleveland, Cincinnati, Chicago & St. Louis in East St. Louis, together with a large amount of merchandise, was burned Jan. 26. The total loss is estimated at $50,000. The fire was caused by the explosion of a barrel of oil.

The State Board of Railroad Commissioners of Missouri has ordered the roads doing business in that State to submit a list of officers, and also copies of all contracts. The statutes provide that such lists and certified copies shall be furnished to the Commissioners, whose duty it is to examine them, and if any of the contracts are found to be in violation of law they are to present them to the Attorney-General of the State for action against the carriers.

Mr. George R. Brown, General Superintendent of the Fall Brook Railway, in an article in *Baker's Magazine*, states that the saving on his road in the matter of wrecks and breakages of rolling stock, in consequence of the improvement in discipline, since suspensions were abolished, has been 66 per cent. The figures are based on the number of tons of freight carried by the road, and the comparison is between two years ending 1885, and two years ending with 1896. Comparing the same years, the reduction in the amount of overtime paid to trainmen has been 82 per cent., and the reduction in the amount of supplies used on locomotives has been 50 per cent. Brown's dircipline is now in force on 32 different railroads

Cost of Early Railroad Track.

In an old pamphlet in the Astor Library are some figures with reference to the cost of a piece of track laid by the Baltimore & Ohio in 1830 and 1831. I. L. Sullivan, in a report to R. L. Colt, estimates that the track laid with wood sleepers, wood bearers and plate rail, exclusive of ground and graduation, would cost $4,362 per mile; with stone blocks, wood bearers and plate rail, of which the cost of iron was $1,324, the cost would be $5,115 per mile; with granite sills in line with plate rail the cost would be $6,500 per mile, divided as follows:

Sills at $11.50 per 100	$3,680
Bar iron	1,300
Broken stone	640
Various items	880

This engineer speculated on two-ton loads and one-ton cars, and said in his report that the B. & O. would be doing a very rash thing if it went beyond this point. He also says "The locomotive engine now operating successfully on the Baltimore road, made by Mr. Winans to run on a friction carriage, though of moderate power, has a great useful effect."

Longer North River Piers.

On Jan. 22 a resolution was adopted by the Dock Board of New York, asking the Secretary of War to allow the extension of all pier lines above Thirty-second Street, on the North River, to a point 200 ft. beyond the present limit. It is reported that this action was taken with a view, if the consent of the Secretary is obtained, to inducing the steamship companies, whose docks are now on the other side of the river, to land their boats in New York.

Lake Carriers' Association Committees.

A list of the most important committees of the Lake Carriers' Association, which were appointed at the recent annual meeting, in Detroit, has been given by Secretary Keep, of the association, as follows: Executive and Finance Committee.—James Corrigan, John Mitchell, H. A. Hawgood, Thomas Wilson, M. A. Bradley, J. C. Gilchrist, L. C. Waldo, D. C. Whitney, William P. Henry, J. J. H. Brown, R. P. Fitzgerald, C. W. Elphicke, H. G. Dalton, W. C. Richardson, B. L. Pennington. Committee on Aids to Navigation.—George P. McKay, W. H. Becker, C. E. Benham, J. G. Keith, W. A. Hawgood, Thomas Wilson, John W. Moore, W. A. Livingstone, W. M. Egan, Frank Owen, A. W. Colton, James Davidson, Alvin Neal, M. M. Drake, Philip Minch. Committee on Legislation.—S. D Caldwell, E. T. Evans, P. P. Miller, H. C. French. Charles Paine, Edward Smith, H. M. Hanna, L. M. Bowers, James Corrigan, W. Livingstone, J. S. Dunham, Jesse Spaulding, C. A. Eddy, Alexander McDougall, Frank J. Firth. Committee on Grain Shoveling.—James Corrigan, J. C. Gilchrist, H. A. Hawgood, Charles Strasmer, Edward Smith, James McKenzie; James Davidson. Committee on Ore Trimming and Unloading.—M. A. Bradley, B. L. Pennington, M. M. Drake, Fred Palmer, John Corrigan.

Gallantry and Economy Combined.

One of the schemes most attractive to the new legislator filled with zeal for reform, is that for compelling every street railroad to carry passengers for nothing unless it furnishes them with seats. The difficulty of administering such a law is apparent, however, even to the reforming legislator, and he generally gives up the idea as a bad job before he gets his bill beyond the committee room. But this year a man has appeared in Missouri who is endowed with better courage, and he proceeds not only to offer his theory, but to show just how it is to be carried out. His name is Dunn, of St. Louis. He says that not providing sufficient cars so that all passengers may have seats, whereby some are required to stand, although paying the same rate as those finding seats, is a violation of the provision of the United States constitution, which guarantees equal rights to all persons; and he makes in his bill a provision that street car companies must carry passengers to whom they cannot furnish seats at half fare. Conductors must be provided with commutation tickets, one of which must be given to every passenger who has paid the regular fare without getting a seat. This commutation ticket is to be good for another ride (standing up) at any future time on any line of the company issuing it. Two of such commutation tickets are to be accepted for a ride when a seat is provided. If a person voluntarily relinquishes his seat in a car for the benefit of another, he is not entitled to rebate, but the person to whom he offers it must take it or forfeit his own right to the rebate, which would be his in case he had no opportunity for getting a seat. The bill provides that in determining whether there is still room for a person to sit down in a car the conductor shall use "good common sense."

Passing by the difficult problem of finding men at $2 a day who are gifted with "good common sense" (or even at $5, in any considerable number), we may observe that this plan gives conductors an excellent chance to increase their knock-down receipts, and that the force of spotters would have to be at once increased. Indeed, the only way to make the scheme work will be to fix in each car an automatic camera by which the exact position of each passenger can be truthfully recorded every five seconds throughout a trip. On lines not usually very much crowded the interval might be lengthened, say, to 10 seconds, thus saving half the expense.

The Chicago Platform in Action.

On the 21st of January a passenger train on the Southern Railway was held up and the express car robbed, near North River Bridge, about 66 miles from Birmingham, Ala. Two months ago the same train was robbed at the same place. About three weeks ago a train was derailed on a bridge a few miles south of Birmingham, causing the wreck of the bridge and the loss of 21 lives. It is the opinion of those best qualified to judge that this accident was caused by the malicious displacing of a rail. Alabama gave 75,000 majority for William J. Bryan. It was to be expected that defeat would cause disappointment, but we were hardly prepared to see the manifestation of the teachings of the Bryan platform accompanied by such extreme violence.

The British Channel Tunnel.

The English technical journals report that the scheme for a tunnel under the British Channel between England and France is dead. The Channel Tunnel Company has made arrangements to devote its capital and its organization to the development of the Kentish coalfields, and has entered into arrangements with a syndicate which is continuing the explorations begun by the Channel company between Folkestone and Dover. The South Eastern Railway Co. also takes part in the new agreement.

Engineering and Electrical Exhibition in New South Wales.

We have received a prospectus of the exhibition to be held in Prince Alfred Park, Sydney, New South Wales, under the auspices of the engineering and electrical associations of New South Wales and under the patronage of the Right Hon. Viscount Hampden. A. D. Nelson, member of the Institution of Mechanical Engineers, is Chairman of the Executive Committee, and the Vice-Chairmen include members of the American Institute of Electrical Engineers and of the Institute of Civil Engineers. The exhibition will be opened in June, 1897, and continue open during the months of July and August. The object being solely for the advancement of engineering science and the promotion of a general and practical education therein, it will be non-competitive, but prizes and certificates of merit will be awarded to students and apprentices. Applications for space must be made not later than March 1, 1897, and exhibitors are requested to state whether exhibits will require special space, together with a description showing their nature and quantity. Motive power will be applied free of cost under certain conditions, but exhibitors will be required to pay for any gas or water which they may use. The Executive Committee desires to encourage the display of machinery and models in operation, and is endeavoring to provide adequate means to meet all reasonable demands in this direction. All communications relating in any way to the exhibition should be addressed to the Hon. Secretaries, Union Chambers, 70 Pitt street, Sydney, New South Wales.

Steel Forging.

Mr. H. F. J. Porter, Western representative of the Bethlehem Iron Co., will read a paper before the Chicago Academy of Sciences, Feb. 24, entitled "Modern Methods of Making Miscellaneous Steel Forgings, Guns and Armor Plate."

LOCOMOTIVE BUILDING.

The report that the Baldwin Locomotive Works has an order for 10 locomotives for the Kansas City, Pittsburgh & Gulf is not correct.

CAR BUILDING.

The Arizona & New Mexico has ordered 10 new box cars.

The Pennsylvania has received four new sleeping cars from the Pullman Company, part of an order for 12 which was placed some months ago.

The Bethlehem Iron Co., of South Bethlehem, Pa., has placed an order with Davis Bros. & Hartmann, of Philadelphia, for six 10-ton liquid cinder cars.

The Pittsburgh, Bessemer & Lake Erie road, the new Carnegie line, has ordered 50 platform cars from the Ohio Falls Car Co., of Jeffersonville, Ind.

The Chicago & Eastern Illinois will order additional coal cars within the next few months. The number is still undecided, but it will be between 250 and 700 cars.

The Ohio Falls Car Mfg. Co. has closed a contract with the Charleston & Western Carolina for 375 freight cars, 10 cabooses and 15 coaches and combination passenger and baggage cars.

BRIDGE BUILDING.

Buffalo, N. Y.—Bids for the superstructure of the bridge over Cazenovia Creek, on Cazenovia street, have been received as follows: Buffalo Bridge & Iron Works, $5,799; King Bridge Co., Cleveland, O., $4,900; Penn Bridge Co., Beaver Falls, Pa., plan 1, $5,500; plan 2, $5,000; plan 3, $5,100; Toledo (O.) Bridge Co., plan 1, $6,700; plan 2, $6,530.

Elkton, Md.—The new iron bridge in course of construction over the Elk River, at Bridge street, has been carried away by the ice and water. The false work upon which the bridge was being built was unable to stand the flow of water and ice. The bridge is being built by the Groton Bridge Co., Groton, N. Y., for the County Commissioners, and is to cost $10,000.

Fulton, Ark.—The President has approved the act allowing the construction of a bridge over the Red River, near here.

Greenburg, Pa.—Bids will be opened Feb. 15 by the County Commissioners for building the abutments for the new iron bridge over Jack's Run, in this town.

Helena, Mont.—The County Commissioners have awarded the contract for the new bridge across the North Fork of the Dearborn to the King Bridge Co., Cleveland, O., for $8,398. Other bids were opened as follows: Wrought Iron Bridge Co, $8,475; C. E. Campbell, $8,639; Missouri Valley Bridge & Iron Works, $8,429; Toledo Bridge Co., $8,674; Milwaukee Bridge & Iron Works, $8,915; Gillette-Herzog Mfg. Co., $8,459; O. E. Peppard, $9,200.

Iowa City, Ia.—The contract for the steel, timber and masonry for a bridge of three 213½-ft. spans, with 200 ft. of approach, has been given to J. R. Sheeley & Co., Des Moines, Ia., at their bid of $12,000. Other bids were: Boynton & Warrener, Cedar Rapids, Ia., $15,700; Clinton, (Ia.) Bridge & Iron Co., $13,593; J. E. Jayne, Iowa City, $12,800; King Bridge Co., Cleveland, O., $14,997; Geo. E. King Bridge Co., Des Moines, $16,620; Marshalltown (Ia.) Bridge Co., $17,584; Massillon (O.) Bridge Co., $13,880; J. E. Quackenbush, Webster City, Ia., $14,000; Wisconsin Bridge & Iron Co., Milwaukee, $14,125; Wrought Iron Bridge Co., Canton, O., $13,700.

Lancaster, Pa.—The Grand Jury has recommended the erection of a new county bridge in West Cocalico Township.

Melita, Man.—Tenders are being received by W. F. Thomas for two bridges, one 76 ft. long, over North Antler Creek, and the other, 80 ft. long, over South Antler Creek. Plans may be seen at the Reeve's office, in this town.

New York.—A bill has been introduced at Albany authorizing the Commissioners appointed to build the new East River Bridge to change the plans of the Brooklyn approach so that it shall form a straight line from the anchorage to its terminus.

Also a bill providing for two drawbridges over the East River. One of these would extend from Washington and Kent avenues, on the Brooklyn side, and to a point near Charles street in this city, and the other from the vicinity of Gold street in Brooklyn to a point near Clinton street.

Northport, Wash.—The contract for a bridge across the Columbia River at this point has been let by the Spokane Falls & Northern to the San Francisco Bridge

Co. It is understood that work will be commenced on the bridge immediately.

Omaha, Neb.—It is stated that plans are being perpared for a $50.000 steel bridge for the Union Pacific at South Fourteenth street. G. H. Pegram, Chief Engineer.

Philadelphia, Pa.—The report of the Harbor, Pilotage and Station Committee states that plans of the proposed Gray's Ferry bridge have been prepared by the City Department for submission to the Secretary of War, and that, in due course, the resident United States Engineer in this city will, doubtless, have the subject under consideration. It is the intention of the Comittee to interview Major Raymond on the subject at an early date.

Phœnixville, Pa.—John Denithorne & Son, of the Schuylkill Bridge Works, have received the contracts for two highway bridges in Maryland.

Rome, N. Y.—The City Engineer has been instructed to prepare plans for a combination wood and iron bridge at the Humaston crossing over Fish Creek, and submit them to the Highway Commissioners for approval.

Spokane Falls, Wash.—City Engineer Oskar Huber is preparing plans and specifications for a bridge across the river at the site of the old Denis and Bradley bridge.

Weldon, N. C.—The town has decided to build an iron and steel highway bridge, to cost $60,000, across the Roanoke River at this place, and it is proposed to issue municipal bonds to that amount.

West Braddock, Pa.—Wilkins & Davison, engineers, Westinghouse Building, Pittsburgh, have awarded the contract for the superstructure of the West Braddock Bridge, over the Monongahela River, to the Pittsburgh Bridge Co. The bridge will consist of three pin-connected spans, 515 ft., 489 ft. and 253 ft. long, and one 80 ft. latticed span over the tracks of the P. McK. & Y. Railway, together with about 1,000 ft. of viaduct. The bridge will have 19-ft. roadway and a 6-ft. sidewalk and will carry a double track electric line. Medium open-hearth steel will be used.

Winnipeg, Man.—The Provincial Department of Public Works has awarded the contract for a bridge over the Assiniboine River, at Le Clare, to Mr. D. F. Patterson, of Birtte.

Winston, N. C.—The building of the newly chartered Stone Mountain Railroad will necessitate considerable bridge and trestle building in Ashe and Watanga counties. Geo. W. Hinshaw, of this piace, is interested in the enterprise.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Cincinnati, Hamilton & Dayton, quarterly, 1¼ per cent. on new preferred stock, payable Feb. 6.

Hoosac Tunnel & Wilmington, 1 per cent., payable Dec. 31.

Illinois Central, 2½ per cent., payable March 1.

Lake Erie & Western, quarterly, 1¼ per cent. on preferred stock, payable Feb. 15

Mahoning Coal, 7 per cent. on common stock, payable Feb. 1.

North Carolina, 3½ per cent., payable Feb. 10.

Pittsburgh & Lake Erie, 5 per cent., payable Feb. 1.

Pullman Palace Car Co., quarterly, $2 per share, payable Feb. 15.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Detroit Union Railroad, Depot & Station Co., annual, Newberry Building, Detroit, Feb. 3.

Los Angeles Terminal, annual, Los Angeles, Cal., Feb 11.

Missouri Pacific, annual, St. Louis, Mo., March 9.

Mobile & Ohio, annual, Mobile, Ala., Feb. 12.

Norfolk & Southern, annual, Norfolk, Va., March 4.

Peoria & Eastern, annual, Danville, Ill., Feb 10.

St. Louis, Iron Mountain & Southern, annual, St. Louis, Mo., March 9.

Texas Central, annual, Waco, Tex., Feb. 12.

Waynesburg & Wilmington, annual, Pittsburgh, Pa., Feb. 2.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *International Association of Car Accountants* will hold a convention at New Orleans, La., on Feb. 23, 1897.

The *American Railway Association* will hold its convention at Richmond, Va., on April 7, 1897.

The *National Convention of Railroad Commissioners* will be held at St. Louis, Mo., on May 11, 1897.

The *International Association of Ticket Agents* will hold a convention at San Antonio, Tex., on March 10, 1897.

The *Association of American Railway Accounting Officers* will hold a convention at Richmond, Va., on May 26, 1897.

The *Association of Railway Claim Agents* will hold its convention at St. Louis, Mo., during the last week of May, 1897.

The *Master Car Builders' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 8, 1897.

The *American Railway Master Mechanics' Association* will hold its annual convention at Old Point Comfort, Va., beginning June 15, 1897.

The *National Association of Local Freight Agents' Associations* will hold a convention at Washington, D. C., on June 8, 1897.

The *Association of Railway Telegraph Superintendents* will hold a convention at Niagara Falls, N. Y., on June 16, 1897.

The *National Association of Car Service Managers* will hold a convention at Boston, Mass., on June 16, 1897.

The *Train Despatchers' Association of America* will hold a convention at Detroit, Mich., on June 22, 1897.

The *Railway Signalling Club* will meet on the second Tuesday of the months of January, March, May, September and November, in Chicago.

The *Western Railway Club* meets in Chicago on the third Tuesday of each month, at 2 p m.

The *New York Railroad Club* meets at 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Tuesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the second Friday of January, March, May, September and November, at 2 p. m.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November.

The *North-West Railway Club* meets on the first Tuesday after the second Monday in each month, at 8 p. m., the place of meeting alternating between the West Hotel, Minneapolis, and the Ryan Hotel, St. Paul.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2.30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month, at 8 p. m.

The *Western Society of Engineers* meets in its rooms on the first Wednesday of each month, at 8 p. m., to hear reports, and for the reading and discussion of papers. The headquarters of the Society are at 1736-1739 Monadnock Block, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m., except during July and August.

The *Denver Society of Civil Engineers* meets at 3 Jacobson Block, Denver, Col., on the second Tuesday of each month except during July and August.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday, at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 25 East Eighth street, Cincinnati, O., on the third Thursday in each month, at 7:30 p. m. Address P. O. Box 333.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday each month at 8 p. m.

The *Western Foundrymen's Association* meets in the Great Northern Hotel, Chicago, on the third Wednesday of each month. S. T. Johnston, Monadnock Block, Chicago, is secretary.

The *Engineers' Club of Columbus, (O.)*, meets at 12½ North High street, on the first and third Saturdays from September to June.

The *Engineers' and Architects' Association of Southern California* meets each third Wednesday of the month in the Hall of the Chamber of Commerce, Los Angeles, Cal.

The *Engineers' Society of Western New York* holds regular meetings the first Monday in each month, except in the months of July and August, at the Buffalo Library Building.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month, except June, July, August and September

The *Engineers' Society of Western New York* meets on the first Monday of each month at the Society's rooms in the Buffalo Library.

The *Boston Society of Civil Engineers* meets at 715 Tremont Temple, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets at 410 Penn avenue, Pittsburgh, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings on the third Wednesday of each month from September to May, inclusive, at 710 Terry Building Roanoke, at 8 p. m.

General Baggage Agents.

The American Association of General Baggage Agents held its annual meeting at Richmond, Va., Jan. 21. The officers elected for the ensuing year are: G. E. Sipple (D., L. & W.), President; E. F. Wood, Chicago, St Paul, Minneapolis & Omaha, Vice-President; J. E. Quick, Grand Trunk, Toronto, Secretary and Treasurer.

Rensselaer Polytechnic Institute Alumnae.

The alumni of the Rensselaer Polytechnic Institute, of Troy, will hold an annual convention in Chicago, on Feb. 1, 2 and 3, and will be the guests of the Western Society of Engineers. A public meeting will be held in Central Music Hall on the night of Feb. 3. The visiting engineers will have headquarters at the Technical Club. A banquet will be given the visitors at the clubhouse.

Michigan Engineering Society.

The eighteenth annual convention of the Michigan Engineering Society was held at the Hotel Downey, in Lansing, Mich., Jan. 19 to 21 inclusive. The meeting was called to order by the President, George L. Welis, of Bay City, Francis Hodgman, of Climax, acting as Secretary. Papers were read by President Wells, F. F. Rogers, of Port Huron; B. F. La Rue, of Pennsylvania, and others.

Engineers' Society of Western Pennsylvania.

The seventeenth annual meeting of the Engineers' Society of Western Pennsylvania was held on Tuesday evening, Jan. 19. Officers were elected as follows: President, two years, Harry J. Lewis; Secretary, one year, R. A. Fessenden; Treasurer, one year, A. E. Frost; Directors, two years, H. H. McClintic and J. M. Camp. The annual banquet of the society will be held at the Duquesne Club on Feb. 11.

Denver Society of Civil Engineers.

At the annual meeting of the Denver Society of Civil Engineers, held recently at its rooms in the Jacobson Block, the following were elected officers for 1897: President, R. A. Wilson; Vice-President, A. I. Fonda; Second Vice-President, William Ashton; Secretary & Treasurer, Walter Pearl; Executive Committee, P. H. Van Diest, Donald W. Campbell, W. B. Lawson; Librarian, George A. Angell. D. W. Campbell, the retiring President, read an address on "Engineering Ethics."

Civil Engineers' Club of Cleveland.

A semi-monthly meeting of the Civil Engineers' Club of Cleveland was held in the Case Library Building on Tuesday evening, Jan. 26. The paper of the evening was read by Joseph R. Oldham, N. A. & M. E., on "Resistance of Ships and Other Floating Bodies at Deep and Shallow Drafts of Water." The following subjects were discussed: "Shallow Draft Yachts," Water Pressure in the Deep Oceans," "Resistance of Fishes and Fish Torpedoes," "Friction in a Perfect Fluid," "Friction of Solid Bodies," "Screw and Side Wheel Engine Friction," "Resistance of a Plane Passing Through Water," "Speed of Torpedo Boats and Deep Draft Steamers."

The Ohio Gas Light Association.

The thirteenth annual meeting of the Ohio Gas Light Association will be held in New York City, Feb. 3 and 4 at Madison Square Garden. Among the papers to be presented are the following: "Gas Stoves: Their introduction, Construction and Use," by T. C. Jones; "The Large Gas Engine; Its Present Developments and Forecasts of its Future for Electrical Purposes," by E. T. Lloyd; "State Regulation of Corporations," by G. H. Christian; "Some Facts Relating to Gas and Electricity," by J. F. Seamon. An executive session will be held on the morning of Feb. 4 for the purpose of a free exchange of ideas relating to gas machinery and its installation.

Western Railway Club.

At the meeting of the Western Railway Club, on Jan. 19, a committee, consisting of Messrs. Wm. Forsythe, John W. Cloud, F. W. Sargent, Geo. Gibbs and Williard A. Smith, was appointed to consider and recommend, at the next meeting, what disposition should be made of the library presented to the club by the late David L. Barnes. Mr. G. W. Rhodes' paper on "The Air-Brake has a New Enemy," gave the results of an investigation made on the Chicago, Burlington & Quincy, after finding that certain insects, resembling wasps, by building mud nests in the release openings of the retaining valves, made it impossible for the engineer to release the brakes after an application.

New York Railroad Club.

At the meeting of the New York Railroad Club, held Thursday evening of last week, Mr. Leighton's paper on education was discussed, as we have before announced. The attendance was large and the discussion was surprisingly interesting. Hardly anyone was prepared to see so much interest manifested in this subject. An abstract of Mr. Leighton's paper and of the discussion will be published in a later issue.

At the next meeting of the club, Mr. Tatnall, of the Pennsylvania Railroad, will present a paper on the gaging of car wheels in mounting them. The April meeting of the club will be given up to the consideration of the Master Car Builders' rules.

Western Society of Engineers.

The Western Society of Engineers held a meeting at the rooms of the Technical Club, Clark street, Chicago, Wednesday evening, Jan. 20, 81 persons being present. A paper was read by Mr. W. J. Yoder, C. E., on "Mount Wood and Top Mill Tunnels on Eastern Approach to Ohio River Bridge, Wheeling Bridge & Terminal Railway." Details of construction were illustrated by means of the society's new stereopticon.

The meeting of Feb. 3 will be devoted to a reception of the Faculty and National Alumni of the Rensselaer Polytechnic Institute, of Troy, N. Y., at which time the subject "Technical Education" will be discussed. The following papers are to be read at meetings in the near future: "Erection of the Draw Span of the New Rock Island Bridge," by Mr. Ralph Modjeski; "Modern Pumping Machinery," by Mr. E. E. Johnson; "Railway Ties in India," by Mr. Clement F. Street.

The Air-Brake Men's Association.

Mr. S. D. Hutchins has resigned the office of President of the Association of Railroad Air-Brake Men, Mr. M. E. McKee, formerly Vice-President, succeeding him. Mr. Hutchins having severed his connection with the railroad company, is disqualified for holding office. Mr. C. C. Farmer has taken the place of Mr. Otto Best as Chairman of the Committee on "Air Pumps, their Troubles and Treatment, and Tools for Making Repairs," Mr. Best taking the place of Mr. Farmer on "Foundation Brakes for Locomotive Tenders."

The Committee of Arrangements for the fourth annual convention, to be held at Nashville, Tenn., April 13, reports that the Nicholson House has been selected for headquarters, where the following special rates will be given members and their friends: Rooms for single persons, including meals, $2 to $3 per day. Two persons occupying a room together will be given a rate of $2. Meetings will be held in the State Capitol.

Engineers' Club of St. Louis.

A regular meeting of the Engineers' Club of St. Louis was held at 1600 Lucas Place on Jan. 21. The paper of the evening was read by Mr. J. A. Ockerson, on "The Problem of Deep Water Navigation Through the Passes from the Mississippi River to the Gulf of Mexico." The general nature of the delta, the history of the methods of improvements and the present method for the improvement of South Pass were described. The effect of deepening South Pass was shown by the fact that during the last 20 years the number of vessels passing through had been increased only 10 per cent., while the tonnage had been more than trebled. The present contract for keeping open South Pass expires in 1899, and the paper showed the necessity for some immediate action to determine the best method of maintaining an outlet to the Gulf. A discussion followed by Professor Johnson and Messrs. Holman and Robt. Moore. The paper was illustrated by maps, photographs and lantern slides. It was resolved that a committee of five be appointed to prepare a memorial addressed to the Congressional Committee in charge of the appropriation bill, recommending that the appropriation bill for the improvement of Southwest Pass, now under discussion, be made to cover the survey of the entire Delta for the purpose of determining the best location for a deep water channel and the best method for its improvement; that a copy of the memorial be sent to each of our members in Congress, and that a copy be presented for indorsement to the Merchants' Exchange of St. Louis. The following committee was appointed: Mr. Ockerson, Chairman, and Messrs. Russell, Johnson, Holman and Pitzman.

PERSONAL.

—Col. W. B. Hale, at one time General Passenger Agent of the Wabash Railroad, died of heart failure in Columbia, Mo., on Jan. 24.

—Mr. George P. Pelton, for many years President of the Poughkeepsie & Eastern road, died suddenly at his home in Poughkeepsie, Jan. 23.

—Mr. John S. Mason, Division Train Master of the Erie road, has been appointed Master of Transportation of the Pittsburgh, Bessemer & Lake Erie.

—Mr. Walter R. Marden, Assoc. Mem. Am. Soc. C. E., has been appointed Chief Engineer of the Pittsburgh Bridge Co., the appointment to date from Jan. 1, 1897.

—Mr. Charles N. Kight has been appointed Assistant General Passenger Agent of the Georgia & Alabama. Mr. Kight was associated with the East Tennesse, Virginia & Georgia for a number of years.

—Col. C. M. McGhee has been elected a director of the Tennessee Coal, Iron & Railroad Co., to succeed the late John H. Inman, and Col. Oliver H. Payne has been elected to succeed J. Edward Simmons, resigned.

—The members of the Texas Railroad Commission have drawn for their respective terms, Judge Reagan securing the one for six years, Commissioner Stone for four years and Commissioner Mayfield for two years.

—Mr. B. F. Bertolet, Superintendent of the Shamokin Division of the Philadelphia & Reading, has resigned, to take effect Feb. 1. He will engage in the coal business at Girardville. Mr. Bertolet has been connected with the Reading road since 1866.

—Mr. C. L. Strobel, Contracting and Consulting Engineer, with offices in the Monadnock Block, Chicago, will leave Feb. 9 for Europe on a business and pleasure trip to be absent about six months, during which time his offices will remain closed.

—Mr. J. C. Matthews is now Receiver of the Houston Belt & Magnolia Park road, his appointment having been made on Dec. 31 last. He was for a number of years Superintendent of the Houston, East & West Texas road. He is now a member of the City Council of Houston, Tex.

—Mr. F. H. Kingsbury, General Eastern Superintendent of the Union Line of the Pennsylvania road, is now at Redlands, in Southern California, having been compelled by ill health to give up his duties some weeks ago. Recent reports from Mr. Kingsbury state that he has been constantly improving in health.

—Mr. H. R. Harris, Master of Transporation of the northern division of the Grand Rapids and Indiana, has resigned, to accept the office of General Manager of the new Lake Superior & Ishpeming road. He has been with the Grand Rapids & Indiana three years, and was formerly in charge of the street railroad at Pullman, Ill., and in other railroad work.

—Mr. William Towle, Manager of the hotels and refreshment-rooms of the Midland Railway of England, and Mr. C. Trubshaw, Chief Architect of that road, are now in this country investigating the construction and management of the great hotels, with a view of introducing all the best features in a large hotel which the Midland is to build in Manchester.

—Mr. Robert H. England, whose election as General Manager of the Oconee & Western Railroad, a 40-mile line in Georgia, was recently noted, was recently General Manager of the Toledo & South Haven, resigning that office a few months ago. He has been in railroad work a long number of years with the Buffalo, Rochester & Pittsburgh and other roads in New York state.

—Mr. Gibson L. Douglass has been appointed General Manager of the Western Transit Co., the New York Central's Lake Line, to succeed Mr. S. D. Caldwell, resigned. Mr. Douglass has been connected with the road for several years. For a time he was Manager of the New York Central Lighterage Company in New York city, going to Buffalo to take charge of the lake fleet.

—Mr. H. Monkhouse has been appointed Superintendent of Machinery for the Chicago & Alton, vice Jacob Johann, resigned. Mr. Monkhouse is now Assistant Superintendent of Motive Power on the Chicago, Rock Island & Pacific, with which he has been long connectep as Master Mechanic, Assistant General Master Car Builder and Assistant Superintendent of Motive Power and Equipment.

—Mr. Maxwell K. Moorhead, President of the Monongahela Navigation Co., of Pittsburgh, Pa., died at his home in that city on Jan. 13. In 1850 Mr. Moorhead was engaged in railroad contracting in former years and built the old Sunbury & Erie road. He afterward completed several contracts on the Pittsburgh & Steubenville, now part of the Pan-Handle. He became President of the Monongahela Navigation Co. in 1884.

—Mr. Frank Stillwell, Superintendent of the Kansas City Union Depot, died, Jan. 17, on a train between Las Vegas and Kansas. Mr. Stillwell was in his 50th year, and he entered the railroad service in 1870 as a freight brakeman on the Ohio & Mississippi. In 1882 he was appointed Assistant Superintendent of the St. Louis Terminal Railroad Association and was made Superintendent of that association in July, 1889. He went to Kansas City in 1893, as Superintendent of the Kansas City Union Depot.

—Mr. Frank Sleath, Trainmaster of the Buffalo Division of the West Shore, has recently resigned to go to Birmingham, England, as Superintendent of a street railroad company there. He sailed from New York this week, but before leaving was given a complimentary dinner at Newark, N. Y., and he also received a purse of $300 in gold from the members of the West Shore's Buffalo Division. Mr. Frank W. Everett, Chief Train Dispatcher, has been appointed Trainmaster on the Buffalo Division of the West Shore.

—Col. J. B. Moulton died in St. Louis, Mo., on Jan. 20. Col. Moulton was born in 1810, and for about 50 years had been well known among civil engineers in the Mississippi valley. He entered West Point in 1828, and after completing his studies there became engineer of the Chesapeake & Ohio Canal, and in 1836 he built the Lexington & Frankfort road. He moved to St. Louis and was County Engineer, and City Engineer at St. Louis. For a number of years he was Chief Engineer of the Iron Mountain road, Chief Engineer of the North Missouri, now the Wabash road. He retired from active life ten years ago.

—Mr. John M. Roach, who has for several years managed the North Side electric lines in Chicago, one of the Yerkes properties, has been placed in charge of the Western Division. Mr. Roach has been identified with the Chicago electric street railroads since 1872, when, at the age of 21, he secured a position as conductor on a street car of the North Chicago City Railway. After a short time he was made Cashier of the North Side Company, and since that time his advancement has been rapid. He is now Second Vice-President and General Manager of the North Chicago Street Railroad Co., and of the West Chicago Street Railroad Co., and is General Manager of the Chicago Electric Transit Co., the North Chicago Electric Railway Co., and the North Side Electric Railway Co.

—Mr. W. H. Bancroft, who becomes General Manager of the Oregon Short Line & Utah Northern, which through its recent foreclosure will be operated hereafter independently of the Union Pacific, has been since 1891 Superintendent of the Mountain Division of the Union Pacific, which includes the lines of the Oregon Short Line & Utah Northern. He has been in railroad service since 1856, and since 1869 has been connected with Western roads. In 1872 he was Assistant Superintendent on the Atchison, and three years later became Superintendent of a road in Kansas. In 1878 he was Superintendent of the Denver & Rio Grande, between 1884 and 1886 was a Receiver of the Denver & Rio Grande Western and afterward General Superintendent until 1890. Then he went to the Union Pacific in charge of the operation of the lines of which he is now made General Manager. He is now about 50 years old.

—Gen. W. P. Craighill, Chief of Engineers, U. S. A., Past President American Society of Civil Engineers, will retire at the end of this month. He does not reach the retiring age until next July, but having served 40 years is entitled to retirement on his own application. General Craighill is still in vigorous health, and it is to be hoped that the profession will for many years have the benefit of his active work and interest.

General Craighill was born on July 1, 1833, at Charlestown, W. Va., and entered the Military Academy from that state on July 1, 1849. Four years later he was graduated No. 2 in a class of 52. He served with distinction through the war, and since the war has done a great amount of valuable work on rivers, harbors and fortifications. In 1861 he compiled "The Army Officer's Pocket Companion"; in 1863 he translated and published General Dupont's "Cours de Tactique," and in co-operation with Captain Mendell he also translated Jomini's "Prècis de L'Art de la Guerre."

—Mr Menard K. Bowen, Superintendent of the Chicago City Railway, has been promoted to the position of General Manager of the same road. He was born in Jefferson Barracks, Mo., in 1858, and received his early education at the St. Louis University, and later took a course in engineering at the Washington University. At the age of 19 he entered the service of the United States government as Assistant Engineer of the jetty work in the harbor of New Orleans. In 1880 he became identified with the St. Louis & San Francisco Railroad in charge of the topographical survey from Fort Smith. In 1891 he accepted the position of Assistant Superintendent of the Chicago City Railway Co, and one year later was made Superintendent, with charge of the operation and construction of the road. Mr. Bowen's paper at the St. Louis meeting of the American Street Railway Association on "Track and Track Joints" was a worthy contribution to the literature of street railroad construction and operation, and has attracted considerable attention both at home and abroad.

—Mr. Jacob Johann, Superintendent of Machinery of the Chicago & Alton Railroad, a veteran in the railroad mechanical service, will retire from active duties on Feb. 1 of this year and hopes to spend the rest of his days in quiet leisure at his home in Springfield, Ill., and in going over old times with those friends who stop over to visit him. Mr. Johann has been in railroad service continually for 50 years, from 1847 to 1897. He served an apprenticeship, and was machinist in locomotive works, the old Norris shops and others, for 12 years, and in 1858 went to the shops of the Missouri Pacific. Three years later he was Division Master Mechanic on that road, and since that date he has served as Master Mechanic or Superintendent of Motive Power on various Western roads up to the present time with the exception of a short period when he was with the Safety Car Heating & Lighting Company. The list of offices which he has held is a long one and includes the names of many prominent lines in the Western states. In 1872 he was General Master Mechanic of the Chicago & Canada Southern. Then he was for 10 years, up to 1884, Master Mechanic of the Wabash, St. Louis & Pacific and later Superintendent of Motive Power of the road. In 1886 he went to Texas as Superintendent of Motive Power of the Texas & Pacific, serving in the meantime as Master Mechanic of the Chicago & Atlantic. In 1892 he became Superintendent of Machinery of the Chicago & Alton, which position he now leaves. Mr. Johann has been one of the familiar figures at the conventions of the Master Mechanics' Association, of which he has been a member since 1868. He has served on many committees, and was elected Second Vice-President in 1885 and First Vice-President in 1886. He joined the Master Car Builders' Association in 1887.

ELECTIONS AND APPOINTMENTS.

Ashley, Kendallville & Southwestern.—The stockholders have elected George Strayer, Theodore Gary, H. T. West, George B. Larrabee, N. P. Eagles, John Mitchell and J. F. Meyer, Directors. The offices of the company are at Ashley, Md.

Baltimore & Ohio.—S. P. Peabody, who has been General Agent at Columbus, O., resigned that office but will retain his position as Assistant Division Superintendent. The other position has been abolished by the Receivers.

Baltimore, Chesapeake & Atlantic.—At the annual meeting of the company last week, at Baltimore, ex-Governor E. E. Jackson was elected a Director in place of Brayton Ives, R. B. Dixon in place of Henry O. Havemeyer, and L. H. Miller in place of C. C. Pomeroy. Officers re-elected are: President, John E. Searles; Vice-President, Nicholas P. Bond; Secretary and Treasurer, Winthrop M. Tuttle; General Manager, Willard Thomson.

Barclay.—At a meeting of the Board of Directors in Philadelphia, on Jan. 12, I. O. Blight, Superintendent of the State Line & Sullivan Railroad, was elected a Director and made Superintendent of the road and General Manager of the Long Valley Coal Company.

Chicago, Peoria & St. Louis.—The stockholders of the road have elected as Directors Charles H. Bosworth, H. W. Putnam, Charles D. Moyer, and C. E. Dean. Mr. Dean succeeds D. B. Hatch.

Columbus, Hocking Valley & Toledo.—The appointment of N. J. Medford as Superintendent of Docks at Toledo is announced.

Duluth & North Dakota.—The annual meeting of the stockholders was held Jan. 15, at Drayton, N. Dak., The Directors elected were. D. W. Hines, A. Grindeland, E. A. Taylor and W. B. Kellogg. Officers were elected as follows: President, R. S. Munger; Vice-President, D. W. Hines; Secretary, W. P. Goff, and Treasurer, J. D. Wallace. This is the project known as the Farmers' Railroad, of which some 40 miles has been graded in North Dakota by the farmers. D. W. Hines, who has been the picturesque promoter, has been displaced as the active excutive.

Fonda, Johnstown & Gloversville.—The stockholders of the company, at the annual meeting in Gloversville, N. Y., have elected directors as follows: James Shanahan, Thomas F. Kyne, J. Ledlie Hees, James P. Argersinger, John G. Ferres, James I. Younglove, Samuel H. Shotwell, J. S. Friedman, Gustav Levor, A. J. Zimmer, Z. B. Whitney, George M. Place, Robert T. McKeever, H. Walter Webb and Chauncey M. Depew.

Fort Worth & Rio Grande.—J. D. Huddlestone, having resigned to accept service with another company, Mr R. H. Lord will in addition to other duties previously assigned him, be recognized as Superintendent of Transportation, and have supervision over train, telegraph and station service. His office will be at Fort Worth, Tex.

Great Northern.—J. G. Taylor, Superintendent of the Willmar Division, has been transferred to the Dakota Division. His headquarters will be at Grand Forks, N. Dak. T. E. Adams, Superintendent of the Dakota Division, has been transferred to another position. P. L. Clarity has been appointed Superintendent of the Willmar Division.

Indianapolis Belt & Union Stock Yards.—W. P. Ijams has resigned as President of the company and will be succeeded by D. W. Marshall, of Terre Haute.

Lake Superior & Ishpeming.—H. R. Harris has been appointed General Manager of this road, with headquarters at Marquette, Mich.

Monongahela Connecting.—At the annual meeting of the company on January 11, held in Pittsburgh, the following were elected Directors: H. A. Laughlin, B. F. Jones, George M. Laughlin, William Larimer Jones, James Laughlin, Jr., W. L. King and B. F. Jones, Jr. Henry A Laughlin was elected President; James Laughlin, Jr., Vice-President and Treasurer; Benjamin Page, Secretary and Auditor; B. F. Jones, Jr., Assistant Treasurer; W. W. Willock, General Manager; H. S. Kiehl, Superintendent, and John D. McKennan, General Counsel.

New York Central & Hudson River.—Harry Parry, Passenger and Ticket Agent at Buffalo, has been appointed to succeed Edson J. Weeks, General Agent of the Passenger Department at that point.

Oregon Short Line & Utah Northern.—The new Company will be incorporated under the Revised Statutes in Utah, where more than 400 miles of the company's lines are located, with Samuel Carr, of Boston, as President and George P. Butler, of New York, as Treasurer, and with operating headquarters at Salt Lake, under General Manager William H. Bancroft. The new Board has been agreed upon as follows: Oliver Ames, Samuel Carr, Oliver W. Mink, Henry G. Nichols, Boston; Alexander E. Orr, E. Ellery Anderson, Francis S. Bangs, New York; Thomas R. Jones, Salt Lake City; Gordon Abbott, Boston; Charles H. Coster, New York; T. Jefferson Coolidge, Jr., Boston; Gardiner M. Lane, Boston; Walter G. Oakman, New York; Nathaniel Thayer, Boston, and Walter E. Glynn, New York. The financial headquarters of the new company will be in Boston.

The following are given as the officers of the new company: W. H. Bancroft, now Superintendent of the North Division of the Union Pacific, General Manager; S. W. Eccles, at present General Freight Agent of the Union Pacific, General Freight Agent; D. E. Burleigh, now General Agent of the Passenger Department at Salt Lake, General Passenger Agent, and F. W. Hills, Assistant Auditor of the Union Pacific at Omaha, Auditor. The offices of the road will be at Salt Lake City.

Pittsburgh, Bessemer & Lake Erie.—The directors of the new company are: Andrew Carnegie, New York; Samuel B. Dick, Arthur C. Huidekoper, Meadville, Pa.; Henry C. Frick, John G. A. Leishman, James H. Reed, J. J. Odell, Thomas H. Given, Andrew W. Mellon, Pittsburgh; John Dick, Meadville; J. Edward Simmons, New York; Edwin S. Mills, Cleveland; Thomas H. Wells, Youngstown.

Pittsburgh & Lake Erie.—I. M. Schoomaker, formerly Vice-President, has been elected President, and J. P. Wilson, of Youngstown, Vice-President of the State Line road, becomes Vice-President.

Reynoldsville & Falls Creek.—The officers of the consolidated company are Lucius W. Robinson, Punxsutawney, Pa., President: John F. Dinhey, Rochester, N. Y., Treasurer; John G. Witmore, Secretary. The directors are: Arthur G. Yates, Rochester, N. Y.; Adrian Iselin, Jr., Joseph Lee, Columbus; O. D. Iselin, W. G. Oakman, J. H. Hocart, New York; C. H. McCauley, John G. Witmore, J. M. Grosh, W. W. Ames, E. N. Troxell, W. H. Holladay, Ridgway.

By the merging of these two railroads the Pittsburgh & Rochester will secure a valuable feeder into the soft coal fields of Western Pennsylvania.

St. Louis Avoyelles & Southwestern.—With the resignation of Ira W. Sylvester from the position of General Superintendent the office has been abolished.

Terre Haute & Peoria.—The annual meeting of stockholders was held in Decatur, Ill., on Jan. 20, and directors elected, as follows: James McCrea of Pittsburg; J. T. Brooks, of Philadelphia; and E. F. Leonard, of Peoria.

Wilkes-Barre & Northern.—The company elected officers and directors at its annual meeting last week as follows: President, John B. Reynolds; Treasurer, C. W. Laycock; Secretary, H. W. Kalisch; Directors, E. Troxell, P. R. Raife, Andrew Hunlock, Charles Shupp, Pierce Butler, J. Ridgway Wright, P. Butler Reynolds and Edward Gunster.

RAILROAD CONSTRUCTION

Incorporations, Surveys, Etc.

Beech Creek.—The extension from Patton, Cambria County, 18 miles westward to Carrolton, Pa., is being rapidly built by Geo. S. Good & Co., contractors, of Lock Haven. The new line will be completed by March 1 and placed in operation soon afterward. The extension reaches rich bituminous coal lands in Pennsylvania and is built to carry this coal to tidewater, via the Fall Brook and Philadelphia & Reading and New York Central & Hudson River roads. It is not believed that passenger trains will be run through to Carrolton for some time yet.

Bellefonte & Clearfield.—It is announced that with the opening of spring work will be commenced on the construction of this road, a line 60 miles long, connecing Bellefonte, Pa., with Philipsburg, in the Clearfield region by a direct route. The charter was secured a year ago, and the survey made, but nothing further has been done. Officers were recently elected at Bellefonte, Pa., as follows: President, Chas. Wilhelm, of Reading; Vice President, Jas. Harris, of Bellefonte; Secretary, L. T. Munson, of Bellefonte; Treasurer, Wilfred Hebner, of Philadelphia.

Bridgeton & Saco River.—The stockholders of the company have ratified the action of the directors in voting to extend the road to Harrison, Me., a distance of five miles. The surveys have been made.